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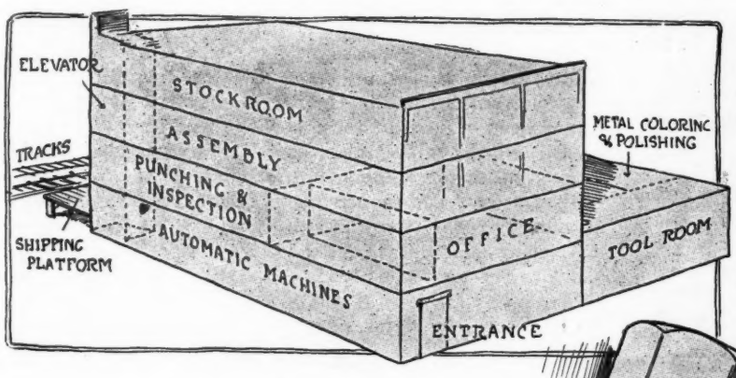
The AUTOMOBILE

25,000 Spark Plugs Per Day —A Factory for Plugs Only

The Annual Output Reaches 7,500,000 from a Four-Story Plant



By L. V. Spencer

Drawings by Sydney Oxberry

TOLEDO, O., May 11—Specialization is one of the greatest factors for success in present day manufacturing. The devoting of a whole department of a factory, and sometimes the entire plant itself, to the making of one product and only one is a modern manufacturing idea which was not practiced in the past. Manufacturers of bygone days did not realize that the concentration upon the production of one article could be brought down to a quantity basis and at the same time preserve the quality. They did not realize the greater efficiency of workmen who day in and day out are concerned with the making of only one thing. They did not see that manufactured goods could be made cheaper if turned out in large quantities from specialized shops.

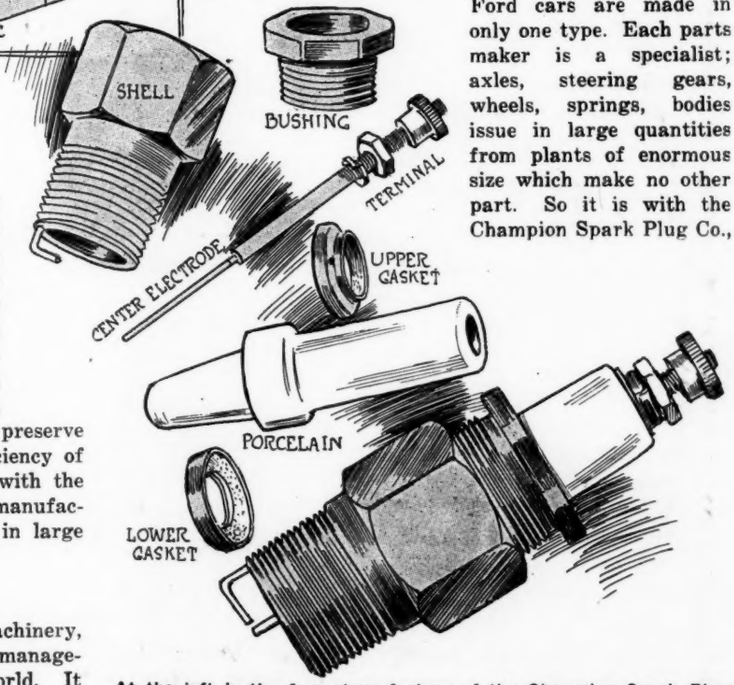
Specialization Means Success

Specialization has come along with better machinery, modern factory buildings and scientific factory management. It has revolutionized the manufacturing world. It has brought order out of chaos and left behind that manufacturer who divides his efforts among several lines of goods. He cannot sell as good merchandise, nor can he sell it as cheaply, for his factory is not giving its undivided attention to any single product.

Take any of the great industrial successes of today and a brief analysis will show them to depend upon specialization for their enormous earnings and size.

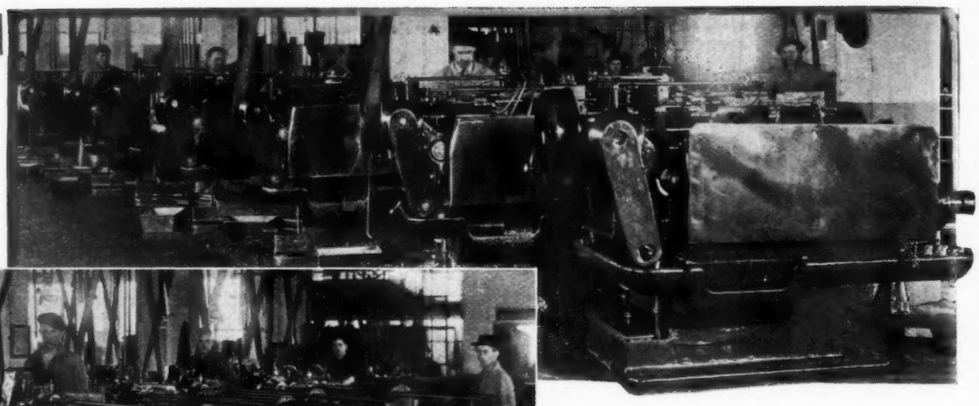
7,500,000 Plugs Annually

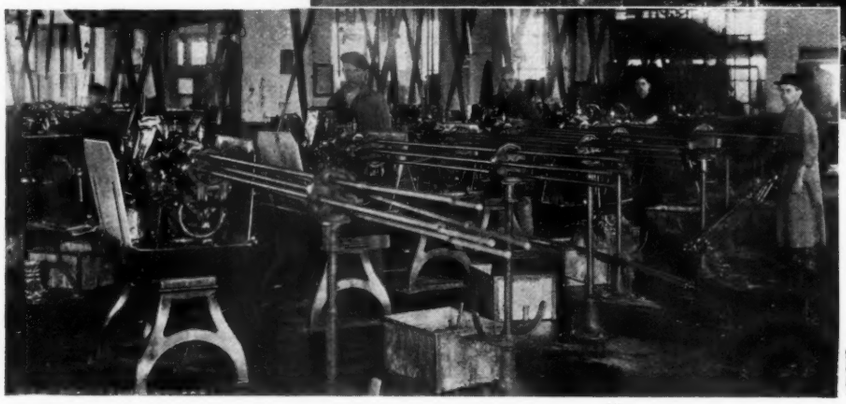
In the automobile industry there are many examples of specialization, both in cars and in parts. Ford cars are made in only one type. Each parts maker is a specialist; axles, steering gears, wheels, springs, bodies issue in large quantities from plants of enormous size which make no other part. So it is with the Champion Spark Plug Co.,



At the left is the four-story factory of the Champion Spark Plug Co., Toledo, O. At the right the plug is analyzed

At the right, some of the automatic machines which make the shell of the plug, the part shown above, out of raw stock fed in the form of rods





At the left is shown a bank of smaller automatics used for the manufacture of the bushings, illustrated below, and brass work of the plugs. These machines are also fed from rod stock

Toledo, O., which in a modern factory of some 45,000 square feet is turning out 7,500,000 spark plugs yearly, and spark plugs alone.

Here is specialization in its most advanced form. A small part of the motor car, yet an essential one, the plug, in this plant is studied just as the motor to which it is fitted is studied and every machine and fixture in the plant is there to aid in the production of 25,000 of them each day or even more for future development.

Such an output is enormous when one stops to think of it, yet carefully planned factory arrangements, special machines and tools and perfected processes all do their part to make it possible. While the writer was at the plant today, between the hours of 9 a. m. and 5 p. m., exactly 23,072 spark plugs were manufactured and packed for shipment to all parts of the world. Before the end of the working day 2,000 to 3,000 more had joined the rest of the day's output.

Growth in 4 Years

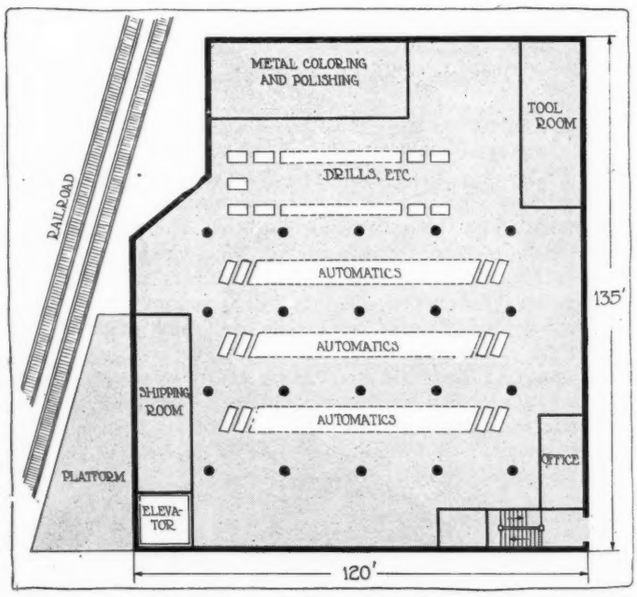
Four years ago the Champion Company was making 4,000 plugs a month; last year the output was 16,000 daily, and since the first of February, this year, the 25,000 average has been maintained. An addition of about 30,000 square feet of floor space in the form of a four-story brick and concrete structure has made this expansion possible, and with it has come every conceivable device for the stepping up of production to its top notch.

The Omnivorous Automatic

Measuring 135 feet frontage and having a depth of 120 feet, the first floor of the new Champion quarters is devoted almost entirely to a bank of automatics which ever operate with human intelligence and feverish haste. There are twenty Gridleys and fifteen Acmes here and they produce from the raw steel stock the outer shells, the center electrodes, bushings and the nuts which are parts of the finished plugs. Standard automatic practice is adhered to, the machines performing all the necessary operations of threading, boring, turning and cutting to proper length. Department reports for May 8, for instance, show the production on these machines of 10,325 bushings, 14,750 shells, 11,000 knurls and other pieces to bring the total for the day shift to 23,830 parts. The night shift produced 13,150 more. One great advantage of these automatics is that they require little attention. Each operator and his assistant have four machines to attend to supply material, etc.

Cheaper Than Hexagonal Stock

But an automatic machine cannot form the hexagonal heads on the shells. Pieces coming from them however go to milling machines specially fitted with jigs for milling five at one time. With a milling cutter on either side of the round turned head of each of the five shells held in a vise-like apparatus on the miller table, two flat faces are cut at once. Having milled these, the eccentric clamps of the jig are loosened by a lever and the five shells revolved a third of a turn, bringing two other faces into position. A third position of the three-space quadrant brings the other two faces into position, and thus in a very short space of time, all six flat faces of the hexagon are formed on the five shells. In a 9 3-4 hour day one operator forms 1,500 hexagonal heads in this way. It is found that it is cheaper to mill these hexagons from



Plan of the ground floor of the new factory of the Champion Sparkplug Co., Toledo, O.

round stock than to use hexagonal stock in the automatics. This is but one of the many processes which are employed to save time and production cost.

The first floor also contains a row of small drill presses whose principal functions are to countersink certain of the pieces and to drill the tiny hole in the side of each shell into which the side electrode is later inserted in another part of the plant.

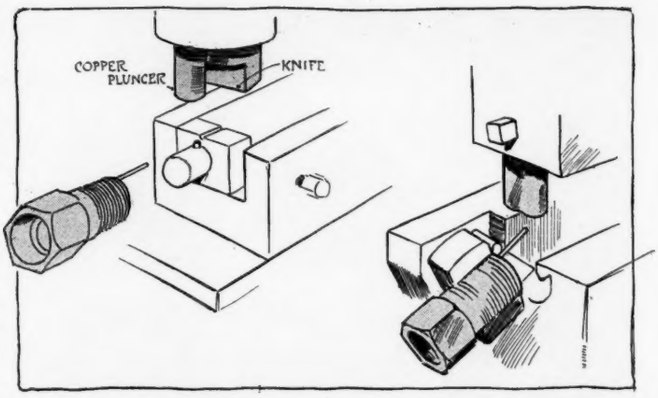
Shells Go Joy Riding

Having received the proper heat treatment, the shells and other parts which do not require this treatment are placed in sheet metal trays and sent to the stock room on the fourth floor. A card accompanies each tray and gives the number of pieces, the various operations which have been performed upon them, the inspectors' names and so on. A large freight elevator at the rear of the building transports the stock to the stock department, from which it may be taken only on order as needed for further incorporation in the finished plugs.

In the punch press department, long strips of copper, brass and asbestos are formed into gaskets, washers and bushings with amazing rapidity. A dozen punches, all of high-speed type, are the equipment of this part of the plant. In one punch, top gaskets are formed with a multiple die, which makes four of them every time the plungers descend. These are cupped so as to fit over the rounded end of the porcelains. The operator turns out 40,000 of them daily. Another punch makes 25,000 bottom gaskets a day. So as not to waste the metal, an indexing point on the die tells the operator how far to move the metal for each punching.

20,000 Gaskets per Machine

Long sheets of asbestos are formed into washers to go against the copper gaskets by these punches at the rate of 20,000 per day per machine, the die being a triple type. Small asbestos washers, which are used on the central elec-

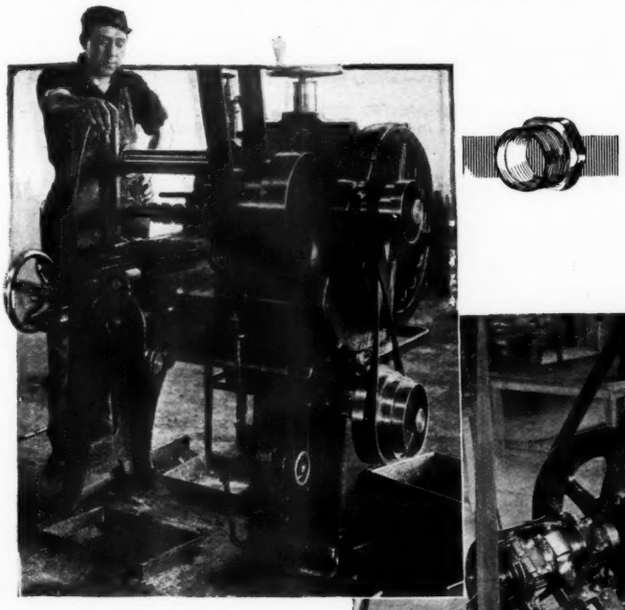


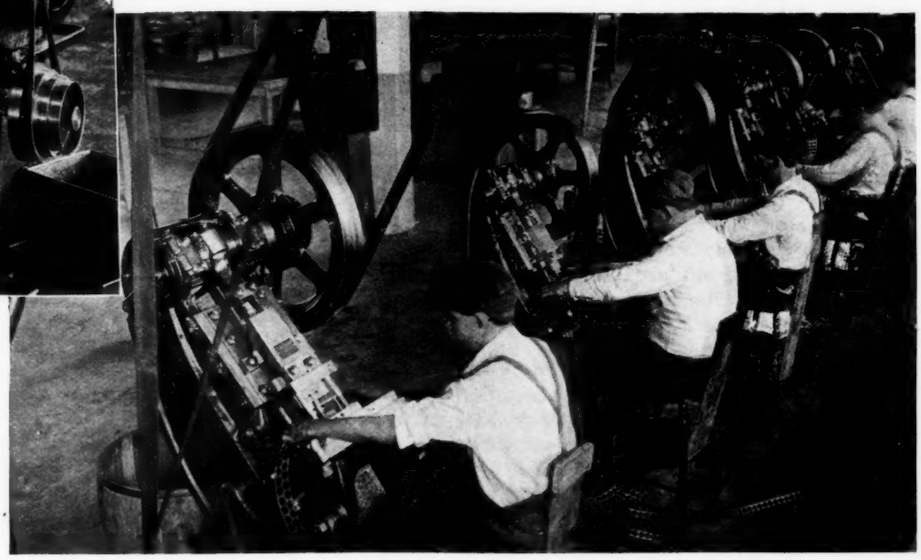
Fitting the side electrode to the shell. At the left is shown the method of securing the electrode by means of a blow struck with a copper plunger, making an indentation inside the shell by a hard steel pin on the anvil. Copper is used so as not to injure the screw thread. The same movement cuts off the wire to the proper length. The following operation, at the right, is that of bending the wire in towards the center

trodes, are punched five at a time. These are only 1-4 inch in outside diameter, but each is perfectly formed. The one machine given to making these turns out 50,000 per day. Naturally, there is dust from the asbestos and much of it collects upon the edges of the die. This accumulation would soon hamper the sharp cutting edge, so tiny streams of compressed air play on the die parts of the asbestos punches at all times when they are operating, keeping them entirely clean.

Welding the Nickel Point

Another interesting process is the electric welding of the manganese nickel spark point to the center electrode to which the ignition wire is attached in service. This nickel point must be an integral part of the electrode before it is put within the porcelain. Three Winfield electric welding machines having special clamps for holding point and electrode are used. In a two-compartment box in front of the operator are the two pieces. He takes one of each, raises the clamp jaws by means of a pedal, puts the pieces in position and releases the pedal, when the clamps hold tightly by springs. Then a lever is drawn over with a vise-like action and brings the ends securely together. In this position, the operator then presses an auxiliary lever on the main lever handle which makes the electric contact and immediately heats the two ends to welding heat. Each man





Above, milling the hexagonal faces of the shell. Two faces of each of five shells are machined in one movement. Thus three movements complete five shells. 1,500 shells can be turned out by this machine in a working day. At the right, a bank of punching presses in which the copper and asbestos gaskets are made. Besides punching, the copper gaskets are cupped to hold the asbestos washers

Left, welding the center electrode to the steel stem by electricity. The electrode, of manganese nickel, is placed in one jaw of the machine and the stem in the other. The lever at the right simultaneously brings the faces together and turns on the current. Over 4,000 can be welded in one machine per day. At the right, an assembly table, where women workers assemble the parts of the plug

welds from 4,000 to 5,000 points per day, the machines working with 220 volts and 15 amperes.

Welded electrodes, gaskets and all similar parts also go upon the elevator to the stock room ready for requisition for assembly. One hundred girls do all phases of the assembly of the plugs. The third floor is used exclusively for this work. Large tables at which from six to eight girls work are provided. Each assembler has the various parts needed for her special assembly job in boxes on her portion of the table before her. At the receiving end of the room the parts are checked out to the girls, who work on a premium system, and who must account for all parts taken. The pieces are counted out by weight.

Two Parts in Assembly

There are two distinct units to the assembly. One is the porcelain and the other the shell. In assembling the former, the center electrode is placed within the porcelain. Two girls work together on this. One covers the electrode with a special cement, after which she passes it on to her partner who inserts it within the porcelain, and having placed a top gasket over it and a lock washer, screws on the brass nut loosely.

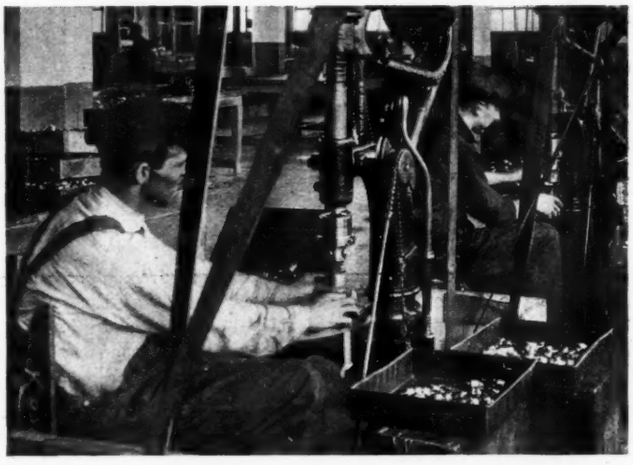
Porcelains thus assembled go to the tighteners who are provided with special tightening machines driven by small electric motors. These machines have quick-acting chucks for gripping the porcelain body, while a hexagonal socket which is revolving turns up the nut on the end of the electrode. The belt driving the little machine slips when the right tension is reached, so that all are evenly tightened.

Baking the Porcelains

Baking of assembled porcelains is now in order, and for this work a special oven with a capacity for some 50,000 porcelains is used. In it the trays of them are heated at 300 degrees Fahrenheit for 48 hours. This has the effect of literally baking the cement into the porcelain and electrode, making an assembly which is just the same as though the porcelain were turned around the electrode. This baking has the same effect as six months in the air would have on the cement.

Inserting Side Electrode

Meanwhile the shells are going through some interesting processes. Coming down from the stock room just as received from the automatics, these shells must be fitted with side wires or side electrodes. This is done by girls in the third floor assembly department who have become exceedingly skilled at the work. Each has on the table before her a



Two of the machines for tightening up the steel bushing which binds the porcelain in the outer shell. An adjustable friction clutch provides for any desired degree of tension

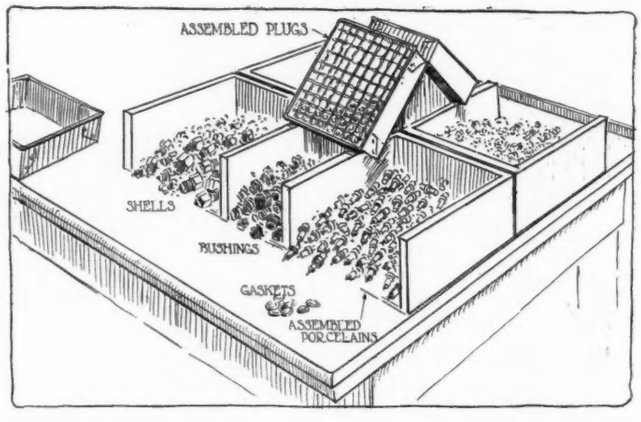
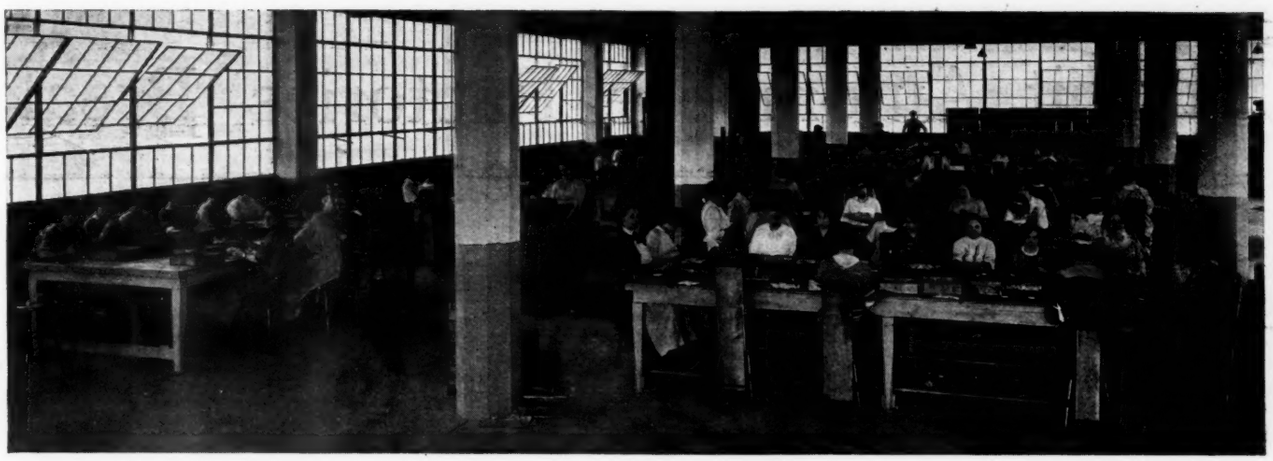
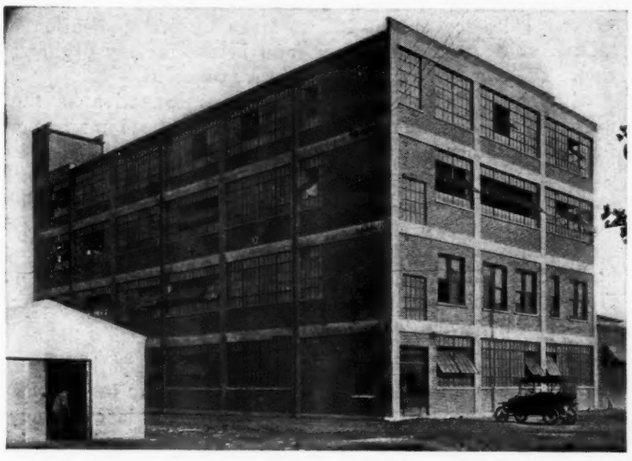


Table layout for woman assembler, who sits facing the center, taking the porcelains with the right hand and the shells with the left, slipping over the bushing from the center compartment and placing the assembled plug in the tray above ready for tightening up and final inspection

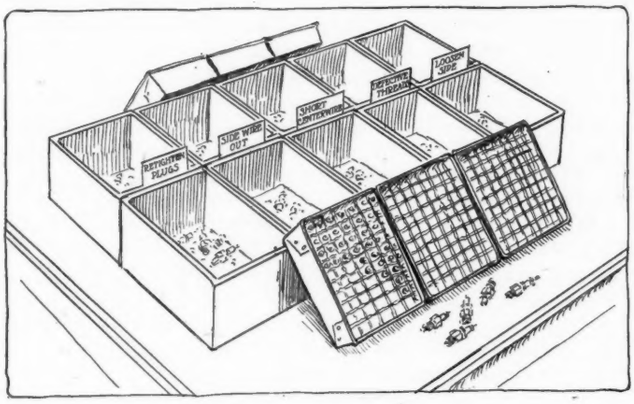
heavy iron flat block about a foot square. On this flat surface, the pin setter arranges a number of the shells with the end already drilled for the electrode uppermost. Then with small metal mallets they drive the nickel pins or elec-



General view of the third floor, which is occupied entirely by the women assemblers. At the table in the foreground the workers are engaged in first inserting the stem in the porcelain and cementing it in place, after which it is baked. Then other workers put the split washers and terminal nuts in place. The porcelain is then ready for the final assembly, illustrated on the opposite page



External view of the four-story factory building now in operation by the Champion Sparkplug Co., Toledo, O. Note ample lighting and ventilation area provided



Lay-out of the final inspection table. The worker places a quantity of plugs on the table and in adjusting the electrodes makes note of any fault, sorting out the faulty plugs in the boxes shown. Each of the trays in front holds 100 plugs. When filled they pass to the packing department

trodes into these holes with great rapidity. Ten thousand electrodes are set by each girl per day.

Shells with electrodes in place now go back down the elevator to the second floor where the electrodes are riveted in place and are bent at right angles in the shells. Special dies in small punch presses do this work.

Reducing the Labor Cost

Motion study is reduced to the last word in the case of these small punches. Brackets on either side of the machine hold the metal trays containing the finished and unfinished pieces. The parts to be worked are on the left and the finished on the right. Thus the operator does not have to move at all to reach either tray. Accordingly, each man turns out from 10,000 to 12,000 pieces each day.

Finished shells with side wires or side electrodes properly bent and fastened go back to the assembly department, where they meet the baked porcelains. The girls doing the final assembling of the two units are given shells, porcelains, bushings and gaskets and have them arranged conveniently around them while working. They place the assembled plugs in pasteboard containers which have 100 compartments each.

Off to the Inspectors

Assembled plugs next go in these containers down to the inspectors on the second floor. Here also long tables play an important part. The inspectors are men who have had a great deal of experience at the work. They carefully examine each plug and reject any with the slightest defects. Before them is a series of boxes for rejected plugs. Each type of defect is given a separate box, so that when they go back to the assembly department for repair the rejected plugs get immediately to that set of assemblers who did that part of the work. Thus there is a box for loose side electrodes, one for side electrodes out, another for plugs to be retightened, a third for short or broken center wires, etc.

Having passed inspection, plugs, still in the 100-lot cardboard holders, come back to the third floor to the packing and shipping girls. Here all grit and dirt are first wiped off. Then each plug is packed in a separate carton, a certain color designating one type of plug only. A hundred individual cartons then go into a larger cardboard case. For large shipments, ten of these cases fit into a wooden box. Fifty of these thousand lot boxes make a carload.

The Champion Company does a large business direct with car makers, supplying some 2,000,000 this year for this trade, principally to Ford, Overland, Studebaker, Maxwell and Metz. Another million goes to makers of other types of gasoline engines, such as marine, stationary, etc. In addition, 500,000 go abroad this year, most of which are metric. Canada also takes a goodly number. There are about eighteen styles of plugs in the Champion line for all purposes.

Detroit Automobile Factories Break Production Records

Many Plants Are Operating at Capacity—Some Working Overtime—1914 Outputs Nearly Completed—Motion Study and Efficiency Methods Show Big Results

Part I

DETROIT, MICH., May 11—Visits to more than a score of the leading passenger car, truck and accessory factories in Detroit have demonstrated to THE AUTOMOBILE that the industry in America's automobile capital is in a most favorable condition, especially as regards its manufacturing side. All of the factories are operating at capacity, over half of them are working the machine shops at night, and some of them on Sunday forenoons in addition. A few who started manufacture early are practically complete with the production of 1914 models, and are getting cleared away for 1915 jobs. In some factories the first allotment of 1915 models are under construction, although announcements of them will not be made probably until July 1.

In spite of the continued backward weather in February, the financial depression which has been so general over the country, the failure of crops in some of the Western grain states and the effects the tariff has had on the sugar industry in the Gulf states, the general condition must be considered good and in the majority of the factories the business for the first 4 months of the present year is much in excess of a year ago. Nearly all of the factories are building more cars than last year, there being a few exceptions where the output is the same, and still fewer where this year's output is lower than that of a year ago.

An interesting aspect of the Detroit industry is the progress made by two or three of the light car and cyclecar companies such as Saxon, Car-Nation and Scripps-Booth. These companies are all manufacturing in large outputs and making regular deliveries. The Ford company is working at approximately 1,100 cars per day. Packard business shows a very great increase over a year ago. Hudson has had a remarkable trade on its small six. Chalmers has recently enjoyed one of the biggest months in its history, and so the story of increased output continues.

Scientific Methods in Shops

One of the most satisfactory developments in many of the Detroit factories during the past year is the increased efficiency brought about by internal rearrangements of manufacturing processes. In some factories more cars are being produced with fewer men than a year ago. Ford has had in operation for some months his new progressive assembly system whereby eighty men are able to assemble a chassis every 53 seconds. The Timken-Detroit Axle Co. is getting greater efficiency out of its workmen by an application of motion study to manufacture, and better factory organization. The same is true of many other concerns.

Although building operations are not so active as they were a year ago there have, nevertheless, been many new factory buildings erected within the last year. Paige is located in its entire new factory. Ford is erecting a mammoth shipping building. Abbott has just completed a new building. The Standard truck is in its new factory, and in several other places additions are being contemplated. Saxon has had to build temporary sheds to take care of its rapid production, and at the Car-Nation plant two big tents are used for emergency factory purposes.

Dealers Are Doing Well

While the Detroit story of trade conditions is a most favorable one, so far as actual factory production is concerned, the presidents and general managers of the companies are equally optimistic on the dealers' situation. The dealers throughout the country are in better condition than a year ago, so far as the majority of the factories are concerned, although there are a few companies that still bewail the poor condition of the dealer. Many factories have worked actively to improve the dealer's lot by assisting him in handling the trading question, as well as conducting his business. Trading is now looked upon as a legitimate part of car selling, and the manufacturers have aimed at making their dealers more rational in handling this work. Trading cannot be eliminated but must be controlled, and in this respect many of the companies have made commendable progress during the past year.

A few of the manufacturers have gone still further with their dealers and have regulated the shipment of cars to them, refusing to allow the dealer to stock up in advance unless quick selling conditions warranted it. On the other hand, there are several companies that have consigned cars to their dealers so as to have them ready for quick warm weather delivery.

2,000 Abbotts for 1915

E. F. Gerber, general manager of the Abbott company, which concern he took control of and reorganized last December, has at present 400 men on the payroll and expects to have 500 cars completed by the end of the present season. He has plans for an output of 2,000 cars for next year. The factory has been operating on a schedule basis since last December and is now working some departments overtime and on Sundays.

Since taking the factory over an entire system of reorganization has been put through. A new three-story building was recently completed and occupied last week. It measures 100 by 75 feet and is used for body work, painting, etc. This with other changes has increased the floor capacity of the plant 35 per cent. A top and body trimming department was started on February 15, this work being previously done by contract.

In analyzing the finances of the company, Mr. Gerber says that by a complete rearrangement of the internal factory systems an economy of $30,000 per month has been accomplished,

chiefly by eliminating direct and indirect non-productive labor. Business throughout the country is good, with the West in the lead. Trade in six-cylinder models is particularly good in the East. Trades enter into most of the sales, but the dealers are more conservative in these than formerly and place more rational values on used cars. The company's business is practically equally divided among its three models.

Cadillac Helps Dealers

The Cadillac Motor Car Co. has been one of the several to carry on a consistent campaign to stiffen the backs of the dealers, and for this purpose employs six district managers, whose sole duty it is to constantly move in and about the dealers and sub-dealers in their respective territories, not only carrying to these dealers the messages from factories on the best methods of doing business, but also working side by side with the dealers and thereby making certain that they understand the factory's wishes and also that systems of doing business in an up-to-date manner are actually installed. This system has proven very successful.

Sales Manager Howard was one of the first to recognize the old adage that you cannot make money by buying an article for more than you can sell it for, and hence the necessity of impressing on dealers the basic consideration of making a rational allowance for a used car when taken in trade.

In handling its used car business, Cadillac dealers have generally followed the policy of rebuilding all used cars and putting them on the market as good vehicles, with some form of personal guarantee. This is good business policy because it is a much better advertisement of a car for the dealers and for the maker to have a well-painted, well-performing used car than to have one poorly painted and not giving the satisfaction that the buyer expected.

Seasoned Dealers Best

The Cadillac company has made it one of its policies of business to stand behind its dealers, and it is not surprising to know that a majority of its dealers have been handling their cars for over 5 years and that the rule generally works out that the best dealer is the one that has handled their car the longest.

In reviewing trade conditions over the past year, Mr. Howard reports a big increase in business in cities, this being led by New York, which has experienced an increase of 44 per cent. over the previous year. Other cities following in line, but with lesser increases, are Philadelphia, Boston, Chicago, Minneapolis, Detroit, etc. With practically all of the dealers closed car business has increased, as it is now possible to use these types approximately 8 out of the 12 months of the year.

Chalmers Breaks Records

April was the biggest month in its history for the Chalmers Motor Car Co., its shipments totalling 1,568 cars, as compared with 1,111 in October. To date the company has finished the manufacture of its large six, and has less than 1,000 of the little sixes to build. It is expected that the company will complete its year by June 1. The Chalmers has been one of the few companies fortunate enough to be producing what is known as the small six-cylinder car in large quantities this year, and has experienced the country-wide demand that has been so general for this type of vehicle. The company has had practically a steady year since it began production last fall, and has been forced to keep its factory at full capacity and to work some of the departments at night since the first of the year.

A characteristic of the business has been the heavy winter sales which have been well ahead of those in previous years, so that instead of the factory going down in December it was worked at capacity.

There has been a 50 per cent. increase in closed cars and although heretofore the sale of closed types has been restricted to upwards of fifteen cities, this year's sales have been scattered over thirty or more, although the original fifteen larger centers have naturally taken the majority. Closed car types have increased considerably in towns such as Youngstown, O., San Antonio, Tex., and others of corresponding population.

President Hugh Chalmers reports that there is less concentration of selling at certain seasons of the year than characterized the industry 2 years ago. There still exists such periods of concentration as early fall, when new models are announced, and also the spring months when deliveries are quickened by weather conditions, but in other seasons of the year sales are spreading themselves more evenly. Some dealers have done 15 per cent. more business between November 15 and January 15 than heretofore, a condition partly explained by increased business in closed cars.

A characteristic of the past year with the Chalmers company has been the assistance they have given their dealers in disposing of used cars taken in trade. This concern, like many others, recognizes that trading has become a legitimate part of the dealers' business and that its success or failure depends on the ability of the dealer to handle it properly. Of 250 Chalmers dealers a great many have been induced to entirely separate the business in new cars from that in used cars. The company endeavors to have its dealers do this, either by carrying the used cars in a separate department in the same building with the new ones, or better still, if conditions warrant it, opening a separate store for the old cars. In such cities as New York, Philadelphia, Boston, Pittsburgh, Omaha, Buffalo, Sioux City, Des Moines, Denver and Minneapolis, the dealers have separate departments on other floors for used cars, so that they are not shown side by side with the new machines. Separate stores for handling used cars are maintained in Chicago, St. Louis, Los Angeles, Memphis and Columbia, S. C.

Makes Used Car Campaign

The company has conducted a persistent campaign all winter, assisting its dealers in the handling of used cars. This campaign has been based on the assumption that used cars constitute a big factor in a dealer's business and the Chalmers people have aimed to demonstrate to their dealers that they should concentrate on selling a new car rather than on buying an old one. They have recommended placing a separate salesman in charge of the used car business and have gone a step further in having this person consulted on the question of allowances to be made on used cars taken in on trades when new cars are sold.

Detroiter Makes 3,000 Cars

According to Claude S. Briggs, president and general manager of the Briggs-Detroiter Co., this concern will close its season on August 1 with an output of 3,000 cars. The factory has been working overtime in the majority of its departments since the beginning of February and will have to continue at this over capacity for some time yet.

The Briggs-Detroiter Co. enjoys a good export business, approximately 20 per cent. of its total output going to foreign lands. Approximately 1 year ago there was more or less slowing up in the export business, due to a variety of causes. In Europe the Balkan War had its effect; in South America several of the countries were in the throes of financial depression, and the money stringency, through which several countries have passed in the last 18 months, obtained almost around-the-world significance. Approximately 6 months ago the export business began increasing and now it is particularly good in Australia, South Africa, England, Norway, Sweden, Russia and other countries.

In analyzing the buying conditions in America, Mr. Briggs, in accordance with many other manufacturers of cars

listing around $1,000, considers the states in the great Mississippi Valley, as well as those bordering on the great lakes, to be the leading domestic market of such vehicles. With crop conditions favorable during the coming season there should be a large demand in this territory for 1915.

Ford Makes 1,100 a Day

The great Ford plant, with its 15,000 workmen, is operating on a schedule of approximately 1,100 cars per day. One day in February it is reported 1,636 cars were manufactured, and on April 30, 1,212 were manufactured in 8 hours, or at the rate of two and one-half cars every minute. The total shipments for April were 30,470 cars, a record month for the company, and to date 150,000 cars for the 1914 output have been produced. The manufacturing year ends on September 30.

This plant has made amazing advances within the last year, chief of which are the enormous new shipping building now nearly completed and the new progressive system of chassis assembly.

The progressive chassis assembly system is one of the most interesting in the motor car world. It may best be described as a railroad track system, because in the factory has been built what looks like a railroad track 800 feet long, with the rails nearly 2 feet from the floor and not so wide apart as in a railroad or trolley line. Eighty workmen line this railroad track from end to end, approximately forty on one side of the track and as many on the other side. The chassis starts its assembly at one end of this track, and is driven off by the tester at the other end. It takes a chassis less than 30 minutes to make the trip from end to end, starting in as nothing and coming off a complete car minus body.

Moving Chain Used

Between the rails of this assembly track is an endless moving chain, traveling much slower than a slow walk. This chain has large catches or hooks on it that catch on the differential housing and keep the chassis constantly moving until it is assembled, not a single stop, to put in the motor, to attach the dash, the gasoline tank or any other parts. It is a pace-setting scheme, the workman must do his job in so many seconds or loses out. The moving chain will not wait for him, for other workmen have their work to do. A half-hour study of this railroad assembly showed that a completed car was coming off every 53 seconds, just as regularly as the second-hand of the watch made its circuit of the dial. It was not once in 53 seconds, not twice in 53 seconds, but every time in 53 seconds, sometimes a few seconds less.

There are three of these railroad-track, progressive assembly systems side by side in the main factory, but these three do not represent the assembly capacity of the great Ford organization, as the company has fifteen assembly factories in different parts of the country and four or five more in process of construction, and in several of these similar joy-ride systems of chassis assembly are in operation. The different units of the car are sent to these assembly plants in huge crates, six motors in a crate, perhaps a dozen rear axles with all necessary equipment in others, etc. Some of these assembly plants are located in the following cities: Detroit, at corner of Woodward avenue and the boulevard, Chicago, Boston, Long Island City, Philadelphia, Buffalo, Minneapolis, St. Louis, Kansas City, Denver, Los Angeles, San Francisco and Seattle. One of the additional assembly plants is being erected in Dallas, Tex.

A New Shipping Building

It is because of this enormous chain of assembly plants in nearly a score of cities that the second interesting factor in the Ford organization, namely, the enormous new shipping building, is being erected. This shipping building is a huge oblong, five stories high and with two open courts extending the entire length of the building and from the ground to the glass roof. Into each of these courts can be run a railroad train. Across the top of the court is a huge traveling crane used for loading crates of parts into the cars. These parts are stored on the five floors of the building, and on each floor is a series of small balconies extending into the court. The crate to be loaded into the railroad car is wheeled onto the balcony, where it is picked up by the crane and lowered from the fifth, fourth, third or second floor into the railroad car. Loading by the crane is not needed on the first floor, which is on a level with the car platform. This great shipping hall has the dimensions of a loading dock for an ocean line, but surpasses anything previously attempted in this or any other line. Like the chassis assembly scheme, it is based on motion study, embracing time and space economy.

Hupp to Reach 12,000

At the Hupp factory the present schedule of seventy-five cars a day is being carried out and the company is prepared to reach 3,000 per month if necessary. To date, Sales Manager F. J. Mooney states that the company has kept steadily ahead of its 1913 output and expects to reach its 12,000 total for the current season. The first 4 months of this year have been considerably better months than the corresponding ones of a year ago. Beginning with production October 1, 1913, the factory has been operating much more steadily than ever before, and, while seasons have changed as compared with a year ago, April being a poor month, the total has held up more evenly than heretofore.

The Hupp company has always been a large exporter of cars and consequently has experienced the same condition throughout the slack months of American buying that other exporters have, namely, that the export trade fills in these intervening depressions and makes it possible to keep production standard.

Scarcely another American company has done such active work as the Hupp company in promoting its export business. A Hupmobile has recently completed a 2-year circuit of the world, in which all the leading countries of the world have been visited and many connections established. Previous to this trip a similar one of shorter duration was staged. As a result of this the Canadian factory of the Hupmobile of Walkerville, Ont., across the river from Detroit, was erected 2 years ago, and its present output of fifteen cars per day goes entirely to export. Mr. Mooney reports a strong trade with South America, good trade to Australia and Africa, in spite of the general depression that has been felt financially in South America, in many sections f Europe and in parts of Africa. In other words, the financial stringency which has been felt in this country for the past year has been existing in several other countries in much more acute stages, and naturally has affected the American export business.

Domestic business in Hupmobiles has increased perceptibly with the farmers during the past year, some of their largest dealers being in such agricultural states as Texas, Nebraska, Minnesota, etc. In some of the farming sections, notably Minnesota, there is considerable demand from the agricultural classes for cars not fitted with electric starting and lighting, this situation with Hupp dealers being the same as that with other dealers in this state. In other sections the electric equipment is generally specified, even with farming communities. A characteristic of the farming business is that there are few trades, the farmer preferring to buy a new article and keeping it for several years rather than trading in at the end of each season.

King Makes Five a Day

"There is to-day much latent business, but as to whether it will materialize into actual business in the immediate future is problematic. What we will call good business in the future for a motor company will not be extra-

ordinary expansion and necessary factory enlargement, but a steady sale each year." In these words Artemus Ward, Jr., president of the King company, estimated the business situation of today. The King factory is at present operating on a schedule of five cars per day and has been working on its regular schedule since last fall, with the exception of temporary slight depression in March, which was general throughout the country. The Middle West affords today the best chances of business, although New England is in particularly good shape and there is plenty of money there, irrespective of the finances of the New Haven and other interests in which New Englanders hold heavy investments.

$1,000 Car Popular

Mr. Ward looks for the small car, the machine listing at $1,000 or thereabouts, to continue in popular favor, irrespective of whether it is made in large quantities such as tens of thousands or in quantities of a few thousand. The success of companies with productions under 4,000 will depend largely on good business management and conducting affairs on a business basis. Where a concern is so organized and so conducts itself it will continue, irrespective of quantity production.

Looking to the future as to the medium-priced car, Mr. Ward sees wide possibilities in a vehicle which at $1,500 can be sold with some form of combination body suitable for summer or winter use. So large a percentage of cars are used little outside of the city areas that it is possible for a single compartment type of vehicle with plenty of window space and relatively light weight to be used for all the touring necessary.

The present tendency of many companies to increase their list prices from year to year is not favored strongly by this concern, which rather believes in a fixed price, and prefers a reduction from year to year rather than an increase, this conclusion being based on an analysis of merchandising conditions. Quite frequently the buying possibility of the public is determined by the fixed value of the car. That figure becomes their estimate of car value. When they decide the question of a new model they will meet that figure. They will more readily meet a slightly lower figure, but it is more or less difficult to carry them $200 or more higher in the scale of price.

Krit Business Booming

H. H. Crawford, general manager of the Krit Motor Car Co., has a very encouraging story to tell about how the concern under the management of the creditors' committee has been able to so extend its business that all payments as stipulated in the agreement will be made on time. The net profits for the month of April were $50,000 and for March $40,000, so that there is no doubt of the concern being on the map in the future. In fact, on the new car which the concern brought out last year, business has been beyond expectations. Since January 1 there have been more orders than the manufacturing department could fill, the increase from fifteen to twenty cars a day at that time to the present output of thirty a day being made necessary. A little better than 500 cars were shipped last month, and as regards money, more was made last month than during the whole of last year. And now, while the factory is not flooded with orders, Krits are not being stored or consigned, nor are they being shipped to dealers who do not want them.

At the present rate, the factory expects to be through with the 1914 production in June. There are only 800 cars more to be built, and allowing the minimum output of twenty cars a day, this leaves only 40 days more. But there is no reason why it should drop back to twenty a day.

Dealers do complain of a backward spring, Mr. Crawford says, but things are opening up in good shape. Eastern business is exceptionally good, and this may be due either to the fact that Krit formerly had poor representation in New York or to the impetus of the new car. Foreign business is also good, although not being specially pushed. Most exported Krits go to London, thirty-five to forty a month going there. South America, Germany, Norway, Sweden, Australia, India, Japan and Hawaii take exported Krits also.

In the United States, the real good territory is found to be northern Illinois, Wisconsin, Minnesota and eastern Iowa. The coast has not proven a very good field. Krit has its normal number of men at present—about 350. In general, Mr. Crawford says the concern has not felt any slump.

Keeton and Car-Nation in Tents

The American Voiturette Co., which manufactures the Keeton large car, as well as the Car-Nation light car, is employing 150 men at present, and had not factory room to take care of the manufacture of the Car-Nation light car on which deliveries were started in February. A large tent has been used for part of the work, and last week a second tent covering space 62 by 105 feet was erected for manufacturing purposes. The Car-Nation light car, $540 as a roadster, and $565 as a touring car, is meeting with great success, and the company is getting these through at a good rate compared with the short time it has had on them. A particularly good progressive assembly system is worked out in which a wheeled metal truck carries each chassis from the start of the assembly until the assembly is completed and the chassis delivered to the body department. Fifteen chassis are on the assembly floor at one time and they keep moving along from one end of the assembly floor to the other end of it as the chassis grows by the addition of motor, radiator, and the other parts. Stock in great quantities is piled in all the storage space as well as in the surrounding yards.

The company is manufacturing its large six-cylinder car in other space in the factory.

The Car-Nation is given a good work-out test before leaving the factory, the motor being first tested on a block. Every car is given a road-test, varying in distance according to the requirements, and there is the usual final inspection.

H. H. Newsome, vice-president and general manager, conceived the idea of a light car such as the Car-Nation, 2 years ago, when foreign constructions were investigated. He early realized that the American light car would have to differ from the English light car or cyclecar. Mr. Newsome was particularly convinced of the great possibility in America for such a light car, after investigating the inquiries from many owners of American motorcycles and many motorcycle manufacturers. In one instance he found 3,000 reports of where motorcycle makers were unable to sell machines, and in practically every case the reasons advanced were the inability of the buyers to operate these machines so far as starting, etc., were concerned. On this assumption Mr. Newsome saw great possibilities in a light car which would be easier to operate and have greater comfort than a motorcycle.

At present the Car-Nation is largely distributed in such centers as Boston, Providence, New York, Philadelphia, Baltimore, Washington, Pittsburgh, Cleveland, Toledo, Nashville, Chicago, Minneapolis, Sioux City, Des Moines, Omaha, Lincoln, Kansas City, Wichita, Dallas, etc.

Hudson Builds 7,000 Cars

After starting production towards the end of 1913, the Hudson company has been operating at schedule ever since and has to-day practically completed its 1914 output of 7,000 cars, made up of 4,500 of its light six models and 2,500 of its larger six. This concern has had one of its most successful seasons for companies selling cars at $2,000 or under, and President R. D. Chapin states that by June 1 not a single Hudson dealer will have any cars on his floor.

Mr. Chapin, who is a keen student of financial conditions, and who keeps his finger on the pulse of public demand, is not concerned so far as the motor industry stands relative to the financial tightness of the last year. This has not affected the motor industry and is explained by the fact that today the automobile is so dominating a factor in life that the business man insists on it. The general labor situation throughout the country is not good and hence many mercantile lines have suffered a business shrinkage because of the cut in buying capacity brought about by unfavorable conditions in the working world.

Mr. Chapin looks for good crop conditions throughout the country and, going on the assumption that "business always follows money tendencies," expects that 1915 will be a bigger season than 1914, and his concern is cutting its cloth accordingly.

Closed Cars Gaining

During the year the Hudson company has very widely extended its field of sales, embracing many smaller towns which heretofore were left to the low-priced car. The company finds that the closed car field has extended very much, particularly in Northern states, where the number of months the car can be used has been increased by the use of closed bodies. There is a considerable awakening in the Southeastern sections of the country, brought about to some extent by the fact that the people in that section are awakening to the possibilities of their land value. Mr. Chapin believes that a potent factor in the success of any company depends on the ability of that company to build the type of car that the people most desire, and that one of the pertinent factors in success is the ability to directly diagnose the changing demands of the people.

Lozier Gains 100 Per Cent.

J. M. Gilbert, president of the Lozier Motor Co., says that his company is leading its business mark of a year ago by over 100 per cent., and that the first 4 months of this year nearly equal in business the 12 months of the 1913 season. The new four-cylinder model launched last December has been a large factor in this increase in business. The factory is now averaging 500 cars per month. In addition to its present plant on Mack avenue just outside of the city boundary the company operates its old Plattsburg plant in New York State, where 600 men are employed. This factory produces nearly all of the iron casting, makes the steering gears and other parts such as pistons, connecting-rods, etc. It has been operating on day and night shifts practically since the first of the year. In the Detroit plant employing 500 men a capacity schedule has been in force for months.

Business Methods

Since assuming active control of the entire Lozier business Mr. Gilbert has directed his energies along two lines, first the production of a small four-cylinder car which he considers ahead of the six as a utility vehicle in which capacity the motor car must be considered today, and second, the conducting of the entire factory on an efficient basis. Mr. Gilbert is a merchandiser and is naturally proud of the fact that he cut the cost of conducting his business to 8.5 per cent. for the month of March and expects to have reduced this figure for April, where the amount of business done was 25 per cent. greater than that in March. An example of how keen Mr. Gilbert is on efficient factory control is brought out in a recent incident of how a low-priced car is used for light freight and express work to and from the city, as it is cheaper to operate than a Lozier would be in the same work. Still another example is that when some office departments expected to have a Lozier at their disposal to go to and from the city he pointed to the trolley line, which is intended for that purpose, and asked some of the men at heads of departments whether if they worked for a large department store would they expect that store to buy a motor car for them to drive around the city in.

150 Monarchs Out

The Monarch Motor Car Co., under the direction of the president, R. C. Hupp, began business last November and has today manufactured approximately 150 cars and is now getting on a basis of production of one car per day. Mr. Hupp, who has had wide experience in that this is his third small car within the last few years, takes the ground that "all motor cars sell themselves, so that when a car is right mechanically the ordinary man can demonstrate and sell it. In other words, there is no competition for a good car at any price. The public is a shrewd buyer and the demand for good cars at different prices is greater today than ever before."

Packard Production Uniform

Business for the past 4 months at the Packard company has been much in excess of the corresponding period a year ago, a fact partly explained by the popularity of the 2-38 model, known as the small six. During April the company shipped 416 passenger vehicles and May is expected to exceed this figure. At present the output of small sixes is entirely taken up and there are only unfilled specifications for less than 100 of the large cars. This will complete the company's output for the coming season.

A characteristic of Packard business during the past year, according to Sidney T. Waldon, vice-president, has been the more uniform rate of production than ever before by this company. From the time production started until the present, there has been a general uniformity which has naturally avoided the necessity of putting on an extremely large force of workmen at any season. The company has been largely responsible for this policy, and has actively engineered its selling forces in order to bring this about. Special efforts were made to stimulate early buying of the closed cars, many specifications for these being placed in the early spring or fall delivery. As a result of this precaution the early fall was a period of uniform production rather than one of great congestion.

Small City Pioneering

The company has also extended its dealers' organization, pushing the confines of selling activity into cities where relatively few, if any sales, were previously made. Although one-half of the Packard output is sold in such centers as Boston, New York, Philadelphia and Chicago, yet this small city pioneering work has proven particularly valuable and now such centers as Salt Lake City, Kansas City, Cleveland, Syracuse, Memphis, etc., have particularly active selling organizations.

The Packard company has always been conspicuous because of its good merchandising methods, and this year it has carried on a selling competition which started January 9 and is still working. The factory issues weekly reports on the percentage of efficiency of its different dealers as compared with previous years. These are tabulated on a large poster distributed weekly throughout the selling organization, and each dealer sees at a glance his percentage of efficiency as compared with a year ago, and can further see how his efficiency stands as compared with other dealers. Not only does this prove an incentive to the individual dealer, but furnishes the company with a very accurate rating of the strength of its respective selling units.

Not only has the Packard company been alert in the merchandising field, but it has been equally so in the production end, and in addition to effecting a uniformity of production over the fall, winter and spring months, it has increased the efficiency of its factory so that now with a force of 5,000 men it is producing more cars than it did with a force of 7,000 men 18 months ago. This has been made possible by im-

provements in factory organization and instituting various forms of pace-setting methods whereby production is quickened. This increase in productiveness has largely eliminated night work in all of the factory departments. Progressive methods of assembly have been instituted and the premium idea which was started a year ago has worked out very successfully.

The Packard company continues its policy of practically rebuilding all of the used cars which come into its possession. Approximately one-half of the sales each year are made with previous Packard owners and generally used cars taken in exchange. Instead of turning these used cars out in practically the same form that they were received, they are entirely overhauled, repainted and put out carrying practically all of the earmarks of new machines.

Paige Increase 136 Per Cent.

To date the Paige-Detroit Motor Car Co. shows an increase of 136 per cent. over the business of the first four months of a year ago, a condition partly explained by the increased production made possible by the large new factory into which the company moved early in the year. Here are the relative figures of production for a year ago and this season:

	1913	1914
January	124	329
February	213	459
March	354	807
April	504	1223

Part of January and February were taken up in moving and the production was correspondingly cut down. The factory is working on an output of 1,400 for May. April was the biggest production month in the history of this company and if the 1,400-car figure set for May is obtained it will establish a high-water mark. The factory is being worked 4 nights a week in machine shop departments as well as Sunday forenoons.

General Manager Bourguin, in surveying the future of the automobile industry, claims that if crops are good this year there will not be any limit to the sale of motor cars for next season. Today conditions for 1914 crops are better than for years, and in many sections of the country where crops were poor last year, such as Kansas, there is more ready money than might be expected. The Kansas farmer husbanded his resources last year, and while he was forced to sell cattle because of the dry season, he sold them at a good market, saved the money and this spring found many farmers with more funds on hand than in some previous years, when finances were not so well managed. Business on the Pacific Coast is poor, Texas is poor in many sections, but many of the large cities such as Chicago and Minneapolis are particularly strong. The lake states of Ohio, Michigan, Indiana, Illinois and Wisconsin are specially strong buyers at present. Many points in Kansas and Missouri are a little slower than the lake states.

60 R-C-H Cars a Week

The reorganized R-C-H company, which purchased the stock of parts and a portion of the factory of the old R-C-H company on February 1, has now 100 men at work and is turning out approximately sixty cars a week. A. P. Sieder, president of the new organization, was secretary of the creditors' committee of the old R-C-H company, and while making up the stock which he took over, has introduced many changes in the car such as new streamline body, new top and other equipment, in addition to many chassis changes. The present management is giving its cars a very complete test out before shipment. The motors are given a block test varying from 4 to 48 hours, and if not right are torn down and after assembly are given another test. Rear axles are tested for noise before being mounted in the car and each car is given a good road test. This program is being carried out with the 300 cars that are being put through in the first quota. The company has retained much of its old selling organization, approximately 75 per cent. of the original 1,200 agencies having been continued.

Regal Output 5,000 Cars

The Regal company has practically completed its output of 5,000 cars on which it started production last August. The factory has been operating steadily all winter and practically steady right up to the present. By the end of May the factory will be clean of 1914 cars, and it is expected that all of the dealers will be cleaned up then, as there is scarcely a dealer with more than five cars on hand today, the company having followed the policy of shipping cars only as needed to the different distributing points.

Fred W. Haines, president of the company and directing spirit of the organization, says that his company annually exports 1,000 cars or more, approximately 20 per cent. of the business, and further that this export business is growing rapidly.

Mr. Haines says that the foundation of the new Regal factory in Berlin, Ont., a growing city not far from Toronto, the capital of the province, has been laid and that the walls are up for the plant, which is a one-story building with a capacity of 1,000 cars annually. Building operations on cars will start June 1. For the present the plant will be used for assembly work only, but ultimately the manufacture of all parts will be carried on there.

Studebaker's Biggest Year

E. R. Benson, vice-president in charge of sales of the Studebaker Corp., says that this year is the largest in the history of this company since it entered the motor field and that January, February and March, 1914, were the largest first quarter of any year. Production of the company's four-cylinder car at $1,050 was started October 15 and has been kept up steadily every day since then. This car is at present being produced in what is known as Plant No. 3 of the Studebaker Corp., located adjacent to the Detroit River. There are 4,500 men employed at this plant. The Studebaker six is manufactured in Plant No. 1, located near North Woodward, and here 3,200 men are employed. Of the two models, the demand for the four naturally exceeds that of the six, but increased demands for sixes are found particularly in the large central agricultural states such as Ohio, Indiana, Wisconsin, Illinois, Minnesota, Iowa and the eastern end of South Dakota. In Ohio and Southern Indiana some of the leading Studebaker dealers report that they are selling one-half of their output of sixes to the farmers.

The necessity of trading used cars in part payment for new ones has been recognized by the Studebaker company and the home office has aimed to control its distributors in this work by recommending that a selling option be taken on the old car on the basis of securing a buyer for it and giving the car free floorspace until sold. Several of the largest dealers do not take trades, but operate entirely on this optional business and do not charge the customer any commission for making the sale on the old car. As a result, such dealers are practically free of used cars at the present time. In cases where the option asked by the dealer on an old car is too low, there has been a marked tendency to lose the sale rather than stock up with used cars taken on at too high a figure.

Good Export Trade

This company has built up a creditable export business, owing to its previous world-wide connections in its vehicle trade, and reports a good demand for sixes in the British Isles, South Africa and South America. Naturally its export trade is greater with the four-cylinder than its six-cylinder car. The Studebaker plants have been operating without any shutdown all winter, and several departments have been put on night work for the four-cylinder model.

Buy Starters Without Study

The Automobile Engineers' Forum

Rushmore Claims That Most American Automobile Manufacturers Purchase Starting Equipment Without Regard to Suitability, Size, Weight or Performance—Is a Simple Power Proposition

PLAINFIELD, N. J.—Editor THE AUTOMOBILE:—The greatest difficulty we have to contend with today is that, even among the leading automobile engineers the self-starter is persistently regarded as a simple accessory, each make having a sort of proprietary characteristic of its own, something like cylinder oil.

It would be so much better for all concerned if only the automobile trade press and the men holding positions as engineers in the automobile factories would stop talking about self-starters and just settle down and take into consideration the fact that the engine starter is nothing in the world but a simple series-wound electric motor, and there is no more problem connected with its selection than there is in selecting an electric motor to drive a printing press or a meat chopper.

Merely a Matter of Common Sense

If the corner grocer is in the market for a motor to drive his ventilating fans or coffee mill, he, or the electric light company, first determines approximately the total horsepower he will require, and accordingly a motor of suitable capacity is installed. The grocer doesn't call for bids on an electric self-grinder, and blindly adopt any old machine that may be first offered him without regard to its size or suitability. He knows that his machinery demands a certain amount of power and he proceeds to buy that much power as a matter of course.

The average automobile manufacturer, however, cannot seem to comprehend that the engine starter is likewise a simple electric power proposition and not one in a dozen has ever made any tests or has the slightest idea how many foot-pounds of energy per minute are required to drive his engine at the desired starting speed at different temperatures. In any other line of engineering the purchaser would determine for himself how much actual power he required under all the conditions to be encountered, would call for bids and performance data on suitable machines, and the selection would be made with intelligent regard to all the conditions.

Makers Buy Starters on Speculation

It is a fact, however, that in the United States most of the orders for engine starters, running into millions of dollars per annum, have to date been placed practically without any regard whatever to engineering considerations. In many cases the directors or officers of the automobile companies are interested in some particular starter. In many other cases where there is free competition, the selection is governed entirely by the price and the ability of the salesman, and thus today not one, but actually dozens, of manufacturers have sent out their cars by the thousand fitted with starters of which they have not the slightest idea as to current consumption or working efficiency.

In the absence of any true engineering discussion in the editorial columns of the automobile papers, we have lately tried to stir up some interest in the engineering side of the engine starter by publishing our performance curves and data of actual performance on engines, and in our advertisements we have gone so far as to challenge our competitors to publish their curves for comparison.

Actual Figures Should Be Given

Considering the dense ignorance of the trade and public alike of the real facts as to the electric engine starter, it would seem to us that the time is now ripe for someone to make public the actual horsepower required to spin new and old engines of different sizes and makes at different temperatures when new and stiff and after becoming limbered up, and also to give the net efficiency of the different makes of starters.

We would suggest that the different manufacturers come forward with their actual data of the performance of their equipment on different makes of engines and under different conditions. We are prepared to give detailed information of the performance of our equipment on the engines of every one of our customers and we believe every one of those customers would be glad to endorse the same for publication. —S. W. RUSHMORE, President Rushmore Dynamo Works.

Finds Four-Speed Gearset Is Best for Use On Heavy Cars

SAN FRANCISCO, CAL.—Editor THE AUTOMOBILE:—For some time I have not read any discussion regarding the correct type of gearset to be used with various models and sizes of cars. In fact, I think that, in what little mention of the subject there has been made in the automobile magazines, little, if any, attention was paid to the type, size or model of the car which was to carry the gearset, the discussion seeming to resolve itself down to arguments for and against the various gearsets themselves, without regard to any other consideration whatever.

Big Cars Need Four-Speed Gearsets

It seems to me that the size, weight, etc., of the car is to be regarded as the determining factor in every case. The whole thing is a matter of such logically proportionate a character that I do not see how intelligent engineers can look at it in any other way. For example, what is the use of equipping a light two-passenger runabout, weighing perhaps 1,100 pounds, with a big, heavy four-speed gearset? Nobody does such a foolish thing, you may say. True enough, but what about the car makers who put out a big, heavy limousine, weighing 3,000 or 4,000 pounds, or perhaps more, equipped with a three-speed gearset, which, though suitable for a medium-sized touring car, or even closed type, is utterly inadequate to develop the highest degree of efficiency on a heavy car. Such a machine as this requires a

four-speed outfit which will give the driver a choice of speeds, resulting in greater flexibility of operation.

Complexity, cost of manufacture, weight and size of the gearset itself, all keep increasing proportionately with the corresponding figures for the car on which the gearset is to be used, provided of course, that the eternal fitness of things is not violated.

I am aware that some of the makers of big, heavy cars who use three-speed gearsets claim that they find this type the most efficient, as the third speed in a four-speed gearset must be geared so low to produce results that it really corresponds to second speed in a three-speed type, while the second speed in a four-speed type is superfluous.

For several years I have driven a car fitted with a four-speed gearset and I find this much more satisfactory than the three-speed gearset with which the car I formerly owned was equipped. I would like to hear the opinions of some of our engineers on the subject.—SPENCER E. HOUGH, B. S.

Thinks Fan Is Not Needed for Cooling System

BALTIMORE, MD.—Editor THE AUTOMOBILE:—For several years I have been expecting a more pronounced tendency to do away with the use of a fan in the cooling system of an automobile, but there seems to be very little progress in this direction evident in our modern cars as compared with the cars of 1906 and 1907, which were the first to show real engineering influence.

Why it should be necessary to add several pounds to the weight of the motor, to say nothing of complicating its construction and cost of manufacture by the incorporation of a fan, whether gear-driven, or what-not, I cannot see.

At the present time we have three methods of cooling automobile motors. The most important, as being the type most widely used, is water-cooling, using a gear pump. This type was employed by 71.8 per cent. of the cars on the market in 1913 and by 72.8 per cent. of those on the 1914 market. Practically all of these use fans. The second type is the method of water-cooling by thermo-syphon, which uses no pump, but does employ a fan. This method was found on 22 per cent. of the 1913 cars and on 24.7 per cent. of the cars for 1914. The third method is air-cooling which, of course, does away with the gear pump, drive, etc., but retains the fan. This type was employed on 6.2 per cent. of the 1913 cars and on only 2.5 per cent. of the 1914 machines.

What I would like to know is, why don't some of our engineers give the matter a little attention and devise some way of getting around some of the problems in connection with the simplification of design of motors, in regard to the method of cooling to be employed and the manner of employing it?—J. BERTON FRASER, M. E.

Block Testing of Motors with City Gas Cheaper than with Gasoline

By Gilbert C. Shadwell, Statistician, National Commercial Gas Assn.

WITH the continued advance of the automobile industry, entailing, as it does each year, the manufacture of upwards of a quarter of a million gasoline engines in Detroit alone, it has become necessary to devise means for their more simple and efficient testing.

The fuel consumption for testing these engines alone is enormous and with the price of gasoline going higher and higher each year, the suggestion was made not long since, as to the feasibility of accomplishing this work with gas.

In an article on the block testing of automobile motors with gas, by A. H. Gindele, *Gas Record*, July 23, 1913, Vol. 4, No. 2, under the heading New Business the writer refers to a test conducted for the adoption of artificial gas for the rough test of automobile engines on the block in the engine assembling department of the Overland company.

The results were so favorable towards artificial gas that it was found that as much as $80 a day would be saved. As a result the necessary changes are stated to have been made for connecting sixty-five gas blocks. The writer draws particular attention to the additional benefits derived in operating conditions, as the atmosphere previously became so bad that the men were unable to work in the test room longer than a few weeks at most. The article is concluded with a statement concerning experiments on a gas mixer device for engines to be operated on compressed artificial gas.

Since that date, city gas has been used very extensively in this connection,—not only on the score of saving in fuel cost has it found favor, but on the better and more efficient working conditions that have resulted from the use of the gas equipment.

Disregarding the enormous value added by better operating conditions, it has been found in a certain test that Detroit city gas at 45 cents a 1,000 cubic feet, is cheaper than gasoline at 9 cents a gallon. The tests showed that:—

Developing 19.04 horsepower per hour the gas consumption was 458 cubic feet per hour which at 45 cents per 1,000 cubic feet = 20.61 cents per hour.

To develop the same horsepower per hour under same conditions, the gasoline consumption was 22.4 gallons which at 15 cents a gallon cost 33.6 cents per hour.

The average calorific value of Detroit city gas was 605 B. t. u.'s, per cubic foot. That of gasoline would have some 120,000 B. t. u.'s per gallon. A certain No Load test showed that city gas cost 58 per cent. of the gasoline cost.

COMPARATIVE TEST SHOWING RELATIVE COST OF GAS AND GASOLINE ON BLOCK TEST. 800 R. P. M. 100 LBS. PULL DEVELOPING 19.04 H. P.

1-14-'13— Time	Cons.	Gas per B. H. P. hr.	1-15-'13— Time	Gasoline reading	Cons.
9:50	...	...	8:10	0.7	..
10:20	230	24.1	8:40	1.7	1.0
10:50	220	23.1	9:10	2.8	1.1
11:20	230	24.1	9:40	4.0	1.2
11:50	230	24.1	10:10	5.1	1.1
12:20	210	22.0	10:40	6.2	1.1
12:50	240	25.2	11:10	7.3	1.1
1:20	240	25.2	11:40	8.4	1.1
1:50	230	24.1	12:10	9.6	1.2
2:20	230	24.1	12:40	10.8	1.2
2:50	230	24.1	1:10	11.9	1.1
Total—	2290	24.0	....	...	11.2

Developing 19.04 horsepower per hour consumed 458 cubic feet of gas per hour which at 45 cents per M. cost 20.61 cents per hour.
Developing 19.04 horsepower per hour consumed 2.24 gallons of gasoline per hour which at 15 cents per gallon costs 33.6 cents per hour.
Gas cost is 61.3 per cent. of gasoline cost.
Gas cost is equivalent to gasoline at 9.2 cents per gallon.

1,200 R. P. M.—125 LBS. PULL DEVELOPING 35.7 H. P.

1-14-'13— Time	Cons.	Gas per B. H. P. hr.	1-15-'13— Time	Gasoline reading	Cons.
3:05	...	...	1:25	12.7	..
3:20	250	28.0	1:40	13.6	0.9
3:35	270	30.2	1:55	14.6	1.0
3:50	270	30.2	2:10	15.6	1.0
4:05	270	30.2	2:25	16.6	1.0
Total—	1060	29.9	....	...	3.9

Developing 35.7 horsepower per hour consumed 1060 cubic feet of gas per hour which at 45 cents per M. costs 47.7 cents per hour.
Developing 35.7 horsepower per hour consumed 3.9 gallons of gasoline per hour which at 15 cents per gallon costs 58.5 cents per hour.
Gas cost is 81.5 per cent. of gasoline cost.
Gas cost is equivalent to gasoline at 12.23 cents per gallon.
Capacity of engine on gasoline—47 horsepower.
Capacity of engine on gas—38.6 horsepower.
Result of test shows that the mixer used is too small to accomplish efficient results developing over 20 horsepower.—*May Bulletin National Commercial Gas Assn.*

Designing a Body for a Cyclecar

Finished Appearance, Light Weight and Inexpensive Construction Are Requisites —Wood, Fiber and Steel Bodies

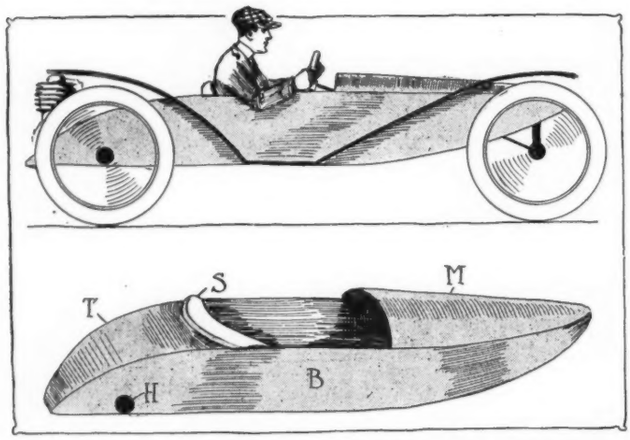


Fig. 1—Body of Carden monocar, the combination frame and body weighing 40 pounds

IN designing the body of a cyclecar there are several objects to be sought. There must be comfort, there must be finished appearance, there must be light weight, and the whole design must be cheap to manufacture for the results given.

By emphasizing the low cost of the design it is not meant that anything should be shoddy or carelessly done, but that every item must be taken advantage of in laying out the parts to get the most for the least. Because a body or frame costs real money to make is no proof that it is a better or more handsome body than another. In fact, the simpler the lines, the cheaper the car can be made. However, to get simple lines an artist must do the job or the work will not carry. A real artist expresses his idea in few lines, and these long. A body designer will do the same for the best and cheapest result.

The simplest body made so far in the cyclecar field is that of the Carden Tweenie, as this ultra-simple car is called. As shown in Fig. 1, this is a combination frame and body, weighing 40 pounds.

A Three-Ply Wood Type

The sides B are of thin three-ply wood 12 inches wide, bent to a point at either end, and curved up on the under side in front, and down on the top side in back, giving a streamline effect. The car is meant to seat but one, and the top is roofed with sheet aluminum M in front in curved form to make a hood, and at the rear T flat, forming a housing for the motor and gearset.

This body forms the basis for the whole car construction. The front axle pivots on its central sprung steering post under the front end. The rear axle extends through the hole H in the body, and couples by a chain to the motor shaft direct, with or without a clutch connection. S is the seat.

This body frame type, from the simplicity and low cost standpoint, is almost ideal for one person, but for two is impracticable. It points out, however, the necessity of combining body and frame, so that a discussion of the body design resolves itself very largely into a frame design talk as in the simple type cyclecar these are generally bound up in each other.

One of the simplest types of frame, Fig. 2, the first developed on the Imp and Steco cyclecars, has two boards B bent into side curves and connected by wooden crosspieces as shown. The floor F is of boards placed lengthwise and stoutly braced to the sides. This makes a very substantial, cheap and light box frame of great rigidity. The partition P between motor compartment and driver's feet is of wood, and the dash D is supported by wooden side pieces as shown.

No Intricate Work Required

The metal which fits over the framework has no forming of intricate nature, the metal bending into place without need of dies or special tools for preparing it. The assembly is thus very simple and cheap. In the Imp the edge is trimmed with a rim of metal as a dust protection. The Steco goes a bit further by edging the body with fine mahogany, and by adding a front end of wider and pleasing lines, the appearance added to the more by the addition of running boards and long fenders.

The Robey cyclecar has a similar construction, but with a longer body. All three cars use cross springs, the Steco, however, having cantilever springing at the rear. These cars are tandem seating with space for the feet of the rear rider on either side of the front seat.

Another system allows the feet of the rear person to extend under the front seat of the car thus allowing sociability and yet plenty of leg room. If the rear seat is too far back the sociability feature is very much less, so that makers aim to get the rear seat as close to the driver's seat as is feasible.

Having the advantages of side-by-side sociability with the disadvantage of a very little extra wind resistance and generally a tread a couple of inches wider, semi-tandem or staggered seating bodies come next in order.

Making Body and Frame Separate

These are built up in the box form as described previously and shown in Fig. 2 or are made in a separate body, fitted to a tubular or similar frame as on the Falcon. This dif-

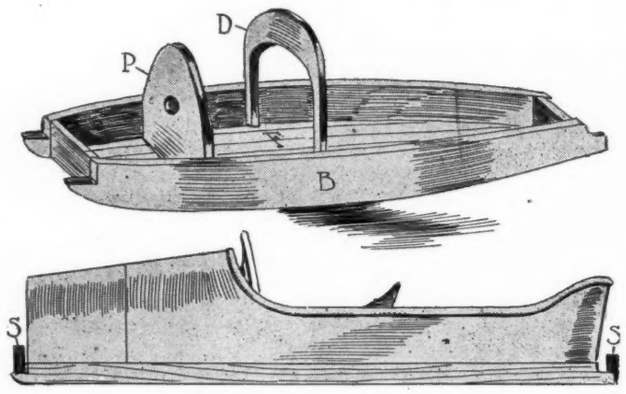


Fig. 2—Upper—Framework of boards. Lower—Type of frame used on several American cyclecars, among which are the Imp, Steco and Robey

fers from most American cyclecars in making the body and frame separate. Fig. 3 shows how the seats are arranged. The Falcon uses bucket seats of the racing type with high backs, and has the driver on the left, and a door on the right.

The Dudley has a solid side with steps for easy entrance, and seats the driver on the right. Both constructions have advantages, and the missionary work of these two firms will probably bring out other semi-tandem cars next year from other plants where experimenting is going on.

A Fiber Aeroplane Body

A type of body not yet developed but which would fit racing cyclecars has been used on aeroplanes. This is a tubular body built of sheet fiber. The trouble with fiber as a body construction is that it changes with moisture, and warps when damp. To make a flat surface of fiber is to court trouble for it may shrink or stretch, in spite of coating of varnish, as much as 1-8 inch per foot. Outside of this, it is stronger for weight than steel, when one considers side strain as well, and a 1-8-inch section can be hit with a sledge without breaking.

In aeroplane bodies the shrinking trouble has been overcome by making every section circular, the body being cigar-shaped and the partitions and braces being made of fiber also, even to the seats. In this way shrinkage, etc., has been equalized and a body of wonderful strength and lightness obtained.

Pressed Steel May Be Used

The eventual body type for cyclecars has not been reached, for lighter, cheaper constructions can be built at no greater expense and will be when quantity production has really begun. Pressed steel constructions can then be used to cut down weight and expense and better appearance given for less money.

For the present the wood frame has advantages. The box type of body, Fig. 2, is mostly used. A disadvantage is in the bending of the boards for the sides, as all do not bend to the same curve without forcing. A recent body design makes the side members straight as in Fig. 4, with sills to give the curved side shape. This simplifies the construction and assembly and stiffens the frame from warpage, the wings W tending to hold things in shape. This also gives space under the wings for the exhaust pipes, wiring and control rods to run to the rear out of sight, as at P. When the floor of the car is as low as roads will permit it is a real problem to be able to conceal the controls and exhaust pipes unless the muffler is in front, which adds to the noise of running. The type of frame in Fig. 4 allows one to run the pipes to the rear and to conduct the exhaust away back of

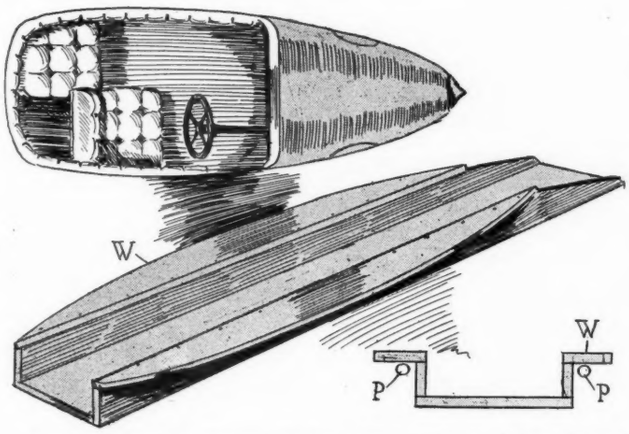


Fig. 3—Upper—Staggared or semi-tandem body of Dudley and Falcon. Frame is of tubing, or as in Fig. 2. Fig. 4—Lower—Straight type of wood body-frame combination

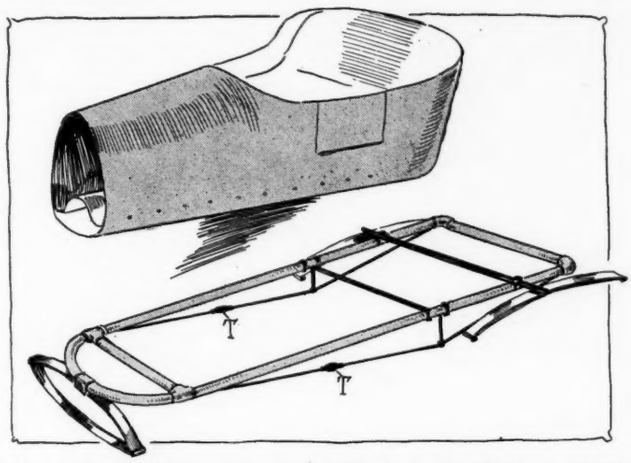


Fig. 5—Upper—Sheet steel combination being developed by Blood Bros. Fig. 6—Lower—Tubular cyclecar frame

the rider. The long pipes in this case almost preclude the need for a muffler.

The Cornelian cyclecar has an interesting body-frame combination, this comprising a two-in-one sheet steel unit. The steel is bent up to a distorted oval section in a way that gives strength with light weight, the shell being reinforced where needed. The top part is to be made of sheet aluminum to still further lighten the construction which is shown in principle in Fig. 5. This construction has great promise, and is being developed by Blood Bros., of Kalamazoo.

Tubular Frame Often Employed

In cyclecars where the frame is separate from the body a tubular frame is often used. In using this construction there must be provision for trussing the frame as the stresses are vertical for the most part, while tubing takes strains in all directions. If strong enough for vertical strains it is too heavy for side strains, but taking a medium and trussing it as at T, Fig. 6, one can make a very light cheap frame. To prevent twisting this type of frame should be suspended from three points as shown, and the frame made up as flexible as is consistent.

The next year will see a development of the cyclecar frame, body and frame-body combinations, all leading to simplicity and low cost, with better road performance, appearance and reliability.

—

Highway Complaint Blanks for Vermont

An innovation is announced by S. Percy Hooker, state superintendent of highways of Vermont, in regard to keeping the Highway Department advised as to conditions of the roads under patrol maintenance.

Each patrolman is to be furnished with complaint blanks and travelers are requested when finding any patrol road out of condition to fill out such blank, giving the cause of the complaint and, in the opinion of the traveler, the proper remedy.

The superintendent urges that all travelers on a section of road who feel that it is not being properly maintained, should stop the next patrolman, ask him for such blank, make it out and either leave with him or mail to the Highway Department.

The superintendent believes that much of the general complaint can be remedied if the traveler will indicate to the department where any laxity occurs.

The blank will require but a moment to fill it out and will enable the department to know the exact section criticised, while in many instances the traveler himself would be later unable to tell exactly the point where such criticisms arose.

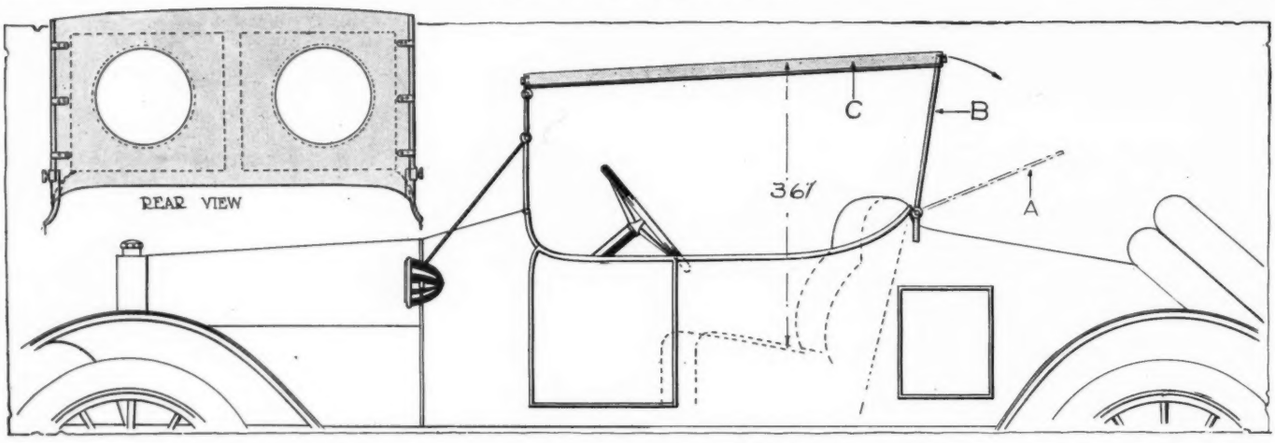


Fig. 1—Two-piece top recommended for use on runabouts when automobilists dislike heavy regulation top. Insert is rear view of same

Two Special Top Constructions

Two-Piece Combination Dust Shield and Top for Runabouts— An Extension for Victoria Tops

By George J. Mercer

SUFFICIENT top covering is one of the essentials for an open car. At any time the weather is liable to change and in addition to the discomfort of being drenched oneself, the interior of the car will become soaked and the dampness is some time drying out from under the seat cushion and in the corners. Ordinarily no great damage is done by wetting the inside of the body, unless the moisture penetrates back of the leather covering. If this happens the hair and the springs that form the upholstering quickly deteriorate and the hair becomes lumpy.

The regulation top with storm curtains is the proper means for protection, but there are some that object to any top on the car, and especially does this apply to runabout users. To suit the tastes of this class of customers, the top, Fig. 1, is recommended. This is a top only when in use. It is comprised of the two pieces, B and C, and side curtains are added when needed. The rear part B is a dust shield but made more solid than usual. It is made up of a wood frame 5-8 inch thick by an average of 2 inches in width and is fastened by clips to the windshield fixture at each side. The whole of the frame is covered with Burbank and celluloid lights are stitched in the material.

The insert in Fig. 1 shows the view from the back of the body with the shield B in position. The top line of the shield is arched to assist in keeping the top deck right for shedding the rain, and the size of the wood frame is indicated by the dotted lines.

Rear Portion a Dust Shield

A, Fig. 1, shows the shield in the position it assumes when not used to support the top deck. At such times it has nothing in its makeup to indicate that it is different from the ordinary dust protector. The height of this shield must be enough to keep the deck 36 inches above the cushion, this being the minimum height for the average person to sit under. The width of the shield must be the same as the deck and this in turn must be the right width so that the side curtains will drop down straight and be outside the body line.

This top is made with a skirt 2 inches deep all around, leather lined to make it stiff. No framing of any kind is used in the deck; it is simply attached back and front to the shields with curtain fasteners and the rear shield is then tilted back until the deck is stretched tight. The skirts on the ends lap over the shields while on the sides the skirts support the side curtains, which are in two pieces to allow of the use of the door. The slope of the top toward the front is not less than 2 inches, more if possible, as this is a great help in assisting the water to run off, and not by its weight cause the goods to sag in the center.

Top and Curtains Roll Up

When not in use the deck and curtains are rolled up and stored in the body. Burbank is the best material to use for the deck and curtains and for covering the dust shield. It is naturally stiff, makes up well and will stand folding away without showing the creases and the cost of equipping an ordinary runabout with the two pieces. B and C and curtains and attaching B will cost approximately $65.00 provided that the windshield does not require to be changed over for the work needed of it.

A top extension for use with a Victoria top is shown at D, Fig. 3. This is a better looking attachment for covering the fore part of the body than is generally seen, and since the adoption of the one man top has become general the appearance is not unfamiliar. This attachment is easily put on and taken off; side curtains can be used with it and storing it away is a simple matter. At the front it is fastened with curtain fasteners and the goods are lipped over the wind-

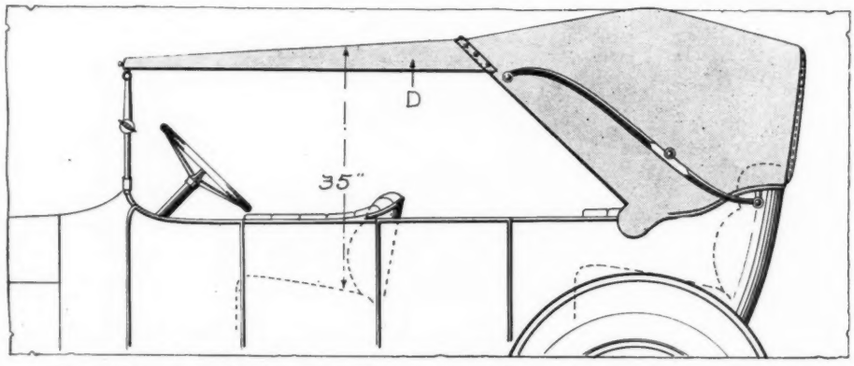


Fig. 3—Top extension for use with a Victoria top. It buttons at front and rear

shield. At the rear of the edge it is concealed in a pocket that is formed by stitching a flap on the Victoria top. The curtain fasteners bind the flap over the end and prevent the water that runs down from the peak of the top entering the lap where the extension joins the top. The front bow of the top should be as high as good looks on a Victoria will permit. This will allow head room for the driver and besides will give more slope to the top line toward the front, the slope not only assisting the water to run off, but the extra depth given to the extension making it stiffer and better looking. The lower edges of the extension are reinforced with leather.

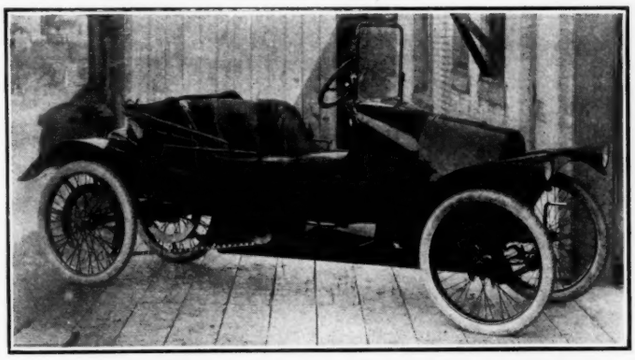
The material of the extension must be flexible and yet match the general appearance of the top. If the latter is of leather, Pantasote will be the best to use. The height of 35 inches is given for the headroom on the front seat. This is slightly under the standard, but as the driver leans forward it can be used satisfactorily.

Saginaw Cyclecar Has Special Motor

The Valley Boat and Engine Works, Saginaw, Mich., has completed its new model of the Saginaw cyclecar, including a new motor designed and built especially for this cyclecar.

The car is shown in the accompanying photograph, and is a belt-drive, staggered seating car of light weight.

The motor, which is the feature of this new model, is a V twin air-cooled plant of 3 3-8 bore and 3 29-32 stroke, with



Saginaw cyclecar built by Valley Boat and Engine Works

Atwater-Kent ignition and Holley carbureter. It has a very neat overhead valve construction.

The cylinders are set at 45 degrees and fasten to the crankcase by four long tie bolts. These also hold on the separate head and allow of valve grinding without taking the cylinders off the motor. The tappets are large and arranged for greatest silence of operation. The crankshaft is extra large and heat treated. The pistons have three rings and are made extra light, while the valves are of tungsten steel with nickel steel stems. A plunger pump feeds oil to the rear cylinder from which it drops to the crankcase and is delivered by splash to the other parts of the motor.

Automobile Upholstery for 1914 Worth $10,000,000

Average of 2.5 *Complete Hides to Each of* 400,000 *Cars Produced—Costs* 20 *cents a Square Foot*

TEN million dollars worth of leather will be used in the automobile industry in America during the 1914 season. The average car requires 2.5 complete hides, the touring car taking about three and the roadster a little over two. The average area of the hides used for automobile upholstery, etc., is 50 square feet and since 1,000,000 hides will be used during the season the area of leather required will be 50,000,000 square feet. This amount of leather would be sufficient to circle the earth at the equator with a band 4.5 inches in width. The average cost of this leather to the automobile industry is about 20 cents to the square foot.

The animal from which the leather is taken for automobile upholstery is the steer or cow. That generally used is the steer which furnishes the best leather for this purpose. The age of the animal from which the hide is taken is anywhere from 2 to 5 years averaging about 3.5. These cowhides are tan in the russet and then split into four different grades known as hand buffs, machine buffs, deep buffs and splits. The hand buff is the side nearest the hair but split by hand, the machine buffs are the sides nearest the hair but split by machinery, deep buffs are taken from the center of the hide and the splits from the side nearest the flesh.

Artificial Leather Increasing

The length of time it takes to prepare a hide from the time it reaches the tanner until it is shipped to the automobile factory varies all the way from 10 weeks up to 6 months, depending upon the particular quality. The hides are ordered in different quantities which vary from contracts of from 5,000 to 10,000 hides covering the season down to mail orders of from 25 to 100 at a time. Many of the manufacturers when they estimate what their output for the year will be, place their order for leather in advance, in the same manner as would be the case for iron or steel, while others merely order in quantities sufficient to meet the needs of the lots of cars coming through the assembling room.

While artificial leather has been generally used only for binding purposes up to a short time ago, the indications are that, with the cutting of costs in the low-priced cars, many of these will be equipped with imitation leather. This is provided, of course, that it can be sufficiently proved that the imitation leather will not have any marked tendency to peel or oxidize under the influence of rain, sun or temperature conditions. These imitations generally have a heavy cloth foundation. The outlook for imitation leather is so great that the Armitage Leather Co., of Detroit, has put up a special plant to supply the market.

Michigan Takes Most Automobile Leather

The State of Michigan naturally takes the largest percentage of leather used for automobile purposes, although most of it is sold through the Newark market and other eastern distributing points. During the year of 1912, 750,000 hides were distributed through Newark and other points in the eastern states. The value of these came to $7,500,000. Some of the concerns which will contribute to these large totals are Hugh Smith Co., Newark, N. J., who will furnish 20,000 hides, the Lackawanna Leather Co., Hackettstown, N. J., which will also supply 20,000, Standard Leather Co., Pittsburgh, Pa., about 25,000 and Coe & Brown of New Haven, Conn., about a like amount.

These figures do not take into account the many miles of belting used in factories devoted to the manufacture of automobile parts and accessories, nor do the many factories which are engaged in turning out work or material sold to the automobile industry. There is no doubt that with these factors considered the amount of leather used would be doubled. On the car itself, the use of the leather-faced cone clutch in 42 per cent. of the cars of American manufacture alone makes a considerable addition to that used in upholstery. Besides this there are numerous odds and ends, such as straps and other accessories, even as far along the line as gloves, which swell the grand total to such an extent that it is impossible to make any accurate estimate as to the millions of dollars worth of business that the automobile has brought to the leather industry.

The Rostrum

Difference in Size of Wheels in Test Not Important

EDITOR THE AUTOMOBILE:—I would be very thankful if you would give Mr. Thomas Bovey of Chicago the following information.

In reply to Thomas Bovey's criticism of the test of the Crown Prince wheel appearing in THE AUTOMOBILE of April 30, I beg to say that on account of being unable to get wheels of exactly the same diameter and the test date drawing closer, I used the wheels in question. However I consider, that this is not very important, as the difference between the pressed steel and the wire wheel was only .5-inch. If anything the wire wheel had the advantage in this test as no doubt a 36 by 4.5 inch wheel is supposed to be stronger than a 35 by 4.5 inch, as it is designed for a larger car.

With reference to weight of the different wheels tested, I wish to say that the wire wheel tipped the scales at 46 pounds, the pressed steel at 39 pounds and the wood wheel at 33 pounds. This information was given in the original data on the test, compiled by the engineering staff of the University of Michigan, but was omitted in the article of April 9 on account of shortness of space.

For your further information I wish to point out that the pressed steel wheel is not heavier than the wire wheel, but weighs considerably less than a real wire wheel, I mean one that is made to suit American conditions, and can be used without fear of continually breaking and bending spokes if this is possible at all.

There is no doubt whatever as to greater strength and general superiority of the pressed steel wheel over either the wood or wire wheel, otherwise it would not be conceivable that some of the foremost European automobile builders would be using the same in preference to both wood and wire wheels.

As to having the Houk Mfg. Co. take up this matter I wish to say that I have informed this company that I will be very pleased to have another test made and use a Houk wheel instead of the McCue type wheel, which was used.

Detroit, Mich. MAX BACHEM.

Motor Will Not Stop

Editor THE AUTOMOBILE:—We have a 1913 car equipped with an Eisemann high-tension magneto, dual with storage battery, and have a trouble which we have not overcome up to this time. We start the engine on battery and turn switch plug to either off, magneto, or battery and take out the plug or key, and the motor runs just the same with the exception of a snapping at the safety gap. It will run with the wire off the breaker box.

The maker says it is wired wrong to the coil but on testing the wires out according to diagram furnished it is right. The car is a Henderson De Luxe and has given the best of satisfaction in every way.

Bosworth, Mo. W. A. B.

The trouble is due either to incorrect wiring or broken connections. Although you have checked up the correctness of the wiring connections once, it would be well to do it again, taking pains to see that the wires are not only in their proper places but that the connections are tight and the insulation intact.

It is most likely that the short-circuiting wire running from the magneto to the switch is at fault. It may be broken or its terminal connections may be loose or out of place, so that when the switch is brought to the off position the current generated by the magneto is not short-circuited and therefore the motor continues running. Examine the switch carefully and tighten all wire terminals.

Connecting-Rod Scoop Too Long

Editor THE AUTOMOBILE:—I would like to ask your advice on a point which has been troubling me in the operation of my 1913 Reo. The car has been run something over 7,000 miles, and during the last thousand miles there has been such a flow of oil into the third cylinder that it is necessary to clean the spark plug in this cylinder every 30 miles or so.

To remedy this flooding I have done the following things: Used different makes of plugs, trying to find one which would burn the oil deposited on it without short-circuiting; used a leaner mixture; filed down the oil scoop attached to the connecting-rod until the scoop dips no more than 1-32 of an inch; taken engine down and replaced top ring of offending cylinder, as well as those of the other three cylinders, with a McQuay-Norris Seals-Proof ring. In each case the net gain has been nothing and I am in a quandary as to what to do next.

The compression in this cylinder is as good as that in any of the others—if not better. The cylinder wall is as smooth as a mirror, and the two split rings left in position appear not to be worn at all. I am afraid to cut down on the oil supply at the pump as the first and fourth cylinders receive no more than is good for them, and the exhaust is not smoky. The second cylinder, however, soots up occasionally, and this leads me to believe that the fault may lie in a too-generous supply of oil delivered to the center bearing from the pipe directed to that point, the oil falling by gravity into the basins under the second and third cylinders, and a little more than half of it flowing under the third. Do you think this theory is a good one, and if so, would a dent in this pipe help matters? One might think that the fault lay in a stoppage of the oil-return pipe, but if this were the case the fourth cylinder would be similarly affected, and anyway, I have discharged an oil gun into this pipe and it has taken the oil as fast as I could squirt it from the gun. I have changed from light to medium oil.

I can think of nothing further which would make you better acquainted with the case.

Garden City, N. Y. R. A. S.

—The construction of this motor is such that there are only two possible explanations of this trouble. One is that the

pistons or rings are worn or loose so that an excess of oil is allowed to make its way up into the top of the cylinder and the other is that the scoop dips too far into the trough.

Since the compression seems to be good it does not seem likely that the trouble is caused by leakage of the lubricant past the piston but it would be well nevertheless to make sure that the piston is not fitting too loosely in the cylinder.

It seems most likely, however, that the excess of oil is the result of the scoop being too low and therefore we think that if you will file the scoop a little more the difficulty will disappear.

Denting the oil-supply pipe will not help the trouble.

Reasons for Offsetting Crankshaft

Editor THE AUTOMOBILE:—It is claimed, and generally taken for granted that when the crankshaft in a motor is offset, side thrust, and consequent wear on the piston and cylinder walls, is greatly reduced inasmuch as the downward thrust on the connecting-rod is in a more nearly parallel line with the direction of piston travel.

I may be stirring up a hornet's nest by entering any argument against this, but I can only find points against such a placing of the crankshaft, not a single one in favor of it as a whole.

Let us say the cylinders are firing in the order of, 1, 2, 4, 3, with number 1 at firing position. An explosion of gas takes place in this cylinder throwing the piston to its lowest point; the force of this explosion we will call "X." An explosion in cylinder number 2 throws its piston downward, with the same force. This movement forces the piston of number 1 cylinder to its original position at upper dead center, and with exactly the same force that was exerted to thrust it downward. In other words, the speed and force of the upthrow are exactly the same as the speed and force of the down-throw; these factors being alike will greatly aggravate the side thrust by setting the crankshaft off center. While it is reduced on the downward motion it is multiplied on the upward motion, thereby causing irregular and undue wear on the piston, cylinder walls and bearings, from my point of view.

Of course, if the piston were returned to its position at upper dead center through a continuation of its own momentum, and were the upward motion somewhat retarded, I could then see the wisdom of offsetting the crankshaft; but as long as the speed of the upthrust, and that of the downthrust, and consequently, the force and friction of both are exactly alike, it would certainly appear entirely wrong to place the shaft in any position other than directly below the center of the cylinder.

It may be that I do not grasp certain points in regard to this matter, and if this is the case, I would be glad to have them shown.

Caldwell, N. J. CARL VON DER HEIDE.

—Were the pressures due to inertia alone are to be considered you are correct in stating that there is no advantage in offsetting the crankshaft, but in the ordinary motor, running at an average speed of, say 800 revolutions per minute, the greatest thrust on the cylinder walls is caused by the pressure of the working gases and not by the inertia thrust of the piston. And it is because the thrust due to the gas pressure is considerably greater that it is deemed expedient by a great many designers to offset the crankshaft, and in this way reduce the relatively excessive pressure occasioned by the expansion of the exploding gases.

In the case of high-speed motors, such as are popular in Europe, the speeds are so high that the greatest inertia thrust is of greater magnitude than the gas pressure and it is common practice to make these motors with crankshafts centrally located.

Construction of Kemco Fan Generator

Editor THE AUTOMOBILE:—Will you please describe the construction of the Kemco fan generator?

New York City. H. F. B.

—The Kemco fan generator, Fig. 1, is a lighting generator that is designed to take the place of the fan and be driven by the fan belt.

Its most notable feature is found in the fact that the armature revolves around the field, the opposite arrangement being common. A ring armature made out of stampings is employed and a disk commutator instead of a cylindrical one is used. The field poles are made in two pieces of cruciform shape, the one being a north pole and the other a south. Between these two members is the field coil which is a shunt type. The current is collected from the commutator by carbon brushes that are placed in recesses in the periphery of the field.

Gearing of Packard, Peerless and Locomobile

Editor THE AUTOMOBILE:—1—How are the seven-passenger 48 models of the Locomobile, Peerless, and Packard geared on each of their speeds? Which speeds are direct drive?

2—What is the weight of each of these cars?

3—What ignition systems are used?

4—Kindly describe the oiling systems of the Packard and Locomobile.

5—What system does the Chalmers Light Six use?

6—What are the advantages in using a gasoline saver?

Beaver Falls, Pa. E. L. G.

—1—The Peerless is geared 3.16 to 1 on high and approximately 5, 7.5 and 9 to 1 on the other three. The Locomobile is geared 3.54, 4.95, 6.79 and 14.5 to 1 and the Packard 3.28, 5.58 and 11.36 to 1.

All these cars are geared direct on high.

2—The weights of these cars equipped with touring

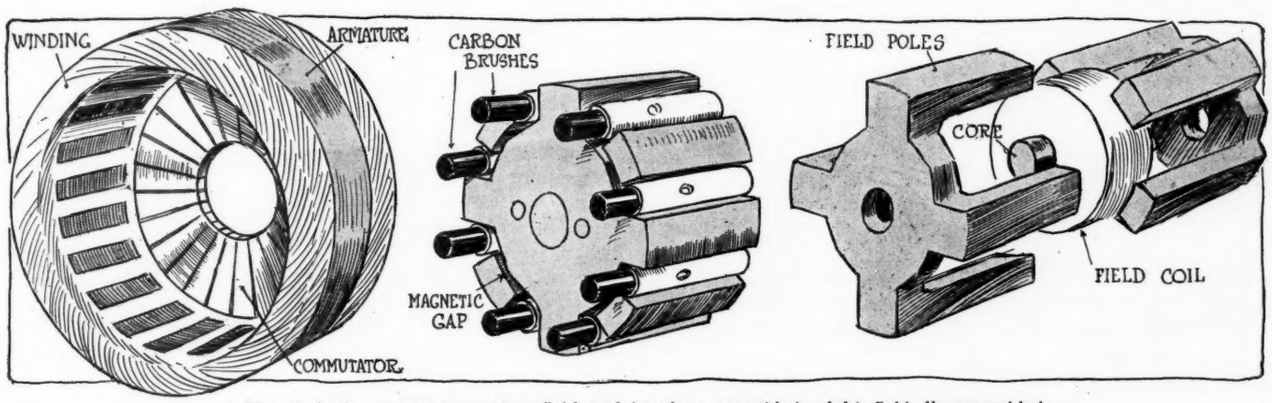


Fig. 1—Left, armature; center, field and brushes assembled; right, field dis-assembled

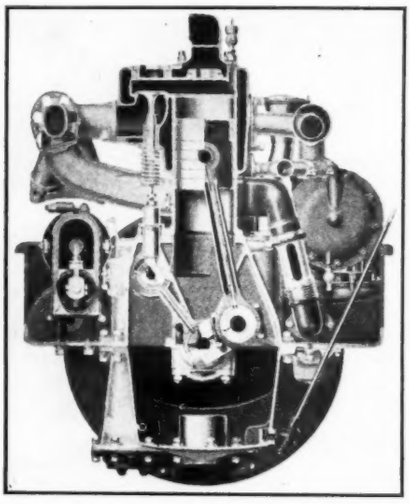


Fig. 2—Section of Packard 48 motor showing oiling system

bodies are: Locomobile, 4,060; Peerless, 4,800; Packard 4,500.

3—The Bosch dual system is used on all three.

4—A force-feed oiling system, Figs. 2 and 3, is used on the Packard. The oil is pumped from the crankcase reservoir through the hollow camshaft which acts as a distributing manifold.

The oil is distributed from the camshaft through the camshaft bearings to each of the main bearings. The crankshaft is provided with oil ducts which carry oil under pressure, to the lower connecting-rod bearings. The oil then continues under pressure, through copper tubes to the piston pin bearings. Baffle plates limit the amount of spray from the lower connecting-rod bearings reaching the cylinder walls to the amount needed for light running. When the motor is under a heavy load the auxiliary system provides for the increased oil requirements of the cylinders.

The front end bearings are lubricated by pressure from the strainer housing. All the overflow from the relief valve flows down and lubricates the front end gears. There are sediment pockets in front and at the rear of the oil pump. The oil is strained before it enters the pump and again before it enters the camshaft. Two baffle partitions are located in the bottom of the crankcase to prevent splashing of oil in the oil well.

Auxiliary Oiling System

The auxiliary oiling system for the lubrication of the piston and cylinder walls, when the motor is under heavy load, enters through the cylinder walls on the right side. This system obtains its supply from the rear end of the camshaft and is controlled by the auxiliary oil valve, which is automatically operated by the throttle. The valve is attached to the rear of the crankcase on the left side. When the motor is idling and the throttle closed, the cylinder walls are lubricated by the spray from the lower connecting-rod bearings and from overflow from the piston pin bearings. When the throttle is opened 1-3 way the auxiliary oil valve starts to open, allowing oil under pressure to enter the auxiliary oil leads. The oil then lubricates the cylinder and piston walls under pressure, the amount increasing with the throttle opening.

The lubricant is carried in an oil reservoir formed by the lower section of the crankcase. It should be filled with cylinder oil to the level of the petcock on the left side of the motor crankcase.

The gear pump is located at the lowest point of the crankcase reservoir and forces oil through the main feed pipe in the bottom of the crankcase to the camshaft which acts as an oil manifold.

The oil strainer and relief valve assembly is located at the front of the motor above the front end gears. The oil enters from the oil pump and passes through the strainer before it enters the relief valve. The relief valve is controlled by a spring and should be set to show 5 or 6 pounds pressure when motor is warm and idling.

When there is excessive pressure in the system, the valve opens and the excess oil flows on the front end gears through a by-pass. When the motor is cold and the oil thick in the pipes the high pressure is relieved by this valve.

The Locomobile system, Figs. 4 and 5, is a combination splash and pressure feed, the lubricant being supplied under pressure to the main bearings and the pressure being sufficient to overcome the centrifugal force due to the rotation of the crankshaft. The rest of the motor is lubricated by the splash created by the dipping of the connecting-rod ends in the troughs. The oil is supplied to the main bearings through a pipe running the length of the crankcase, a branch outlet going to each bearing, of which there are seven. Oil to the troughs is furnished by another pipe that squirts oil by means of individual openings opposite each trough.

Circulation of oil is maintained by a pump which draws its supply from a reservoir in the bottom of the crankcase, the pump forcing oil through both pipes. The supply of oil is regulated by a by-pass valve.

5—The oiling system used on the Chalmers light six is a combination splash and pressure feed maintained by a gear pump. Oil is delivered under pressure through a header to individual ducts leading to the main bearings and the rest of the motor is lubricated by the splash from the troughs into which the connecting-rods dip, oil being delivered to the troughs through another header.

6—The advantage of the fuel economizer is that when traveling along good roads where a minimum of power is required the mixture can be weakened by admitting air through the economizer. This was thoroughly discussed in the Engineers' Forum of THE AUTOMOBILE last week.

How to Weld Aluminum

Editor THE AUTOMOBILE:—1—We are experiencing some difficulty in welding aluminum, the chief trouble is in the weld cracking in cooling. Is there any flux used in welding with aluminum solder, if so, what is the flux composed of?

2—Could you give me the dates of the issues in which and description of the Entz electric transmission and tables of horsepower, sizes of motors and specifications of the various American cars were published?

3—What is the horsepower formula used by the A. L. A. M.?

Seattle, Wash. STUART HARRISON.

—Welding aluminum is a difficult job and calls for a great deal of skill that can only be obtained by experience, and your difficulty may be due to several causes.

The metal can be welded either with or without a flux, but it is preferable to do the work without one for the reason that the flux hardens the metal in the joint. The using the flux is that it makes the solder more fluid and therefore it is a little easier to do the work but when all the conditions are right and with a certain amount of experience the operation can be performed almost as readily without its use and with the result that a much

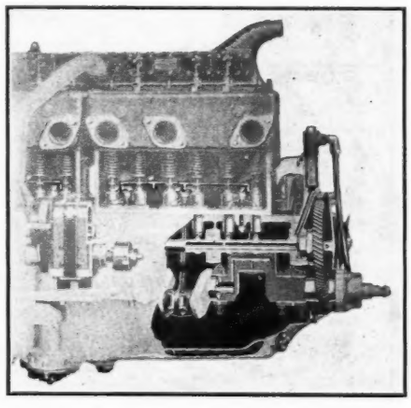


Fig. 3—Part section of Packard 48 motor showing oiling system

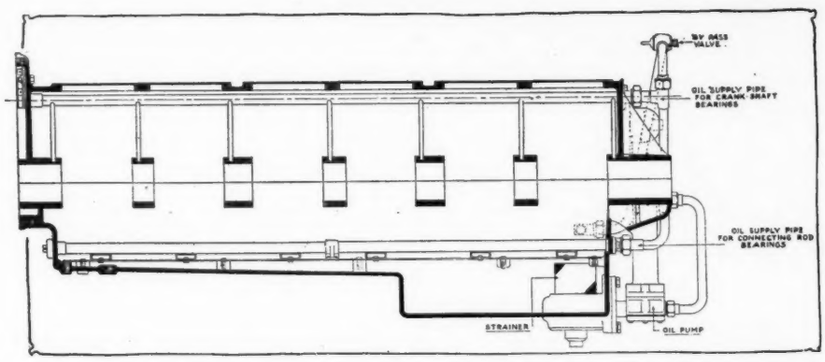


Fig. 4—Left—Section through Locomobile 48 crankcase showing system of oiling

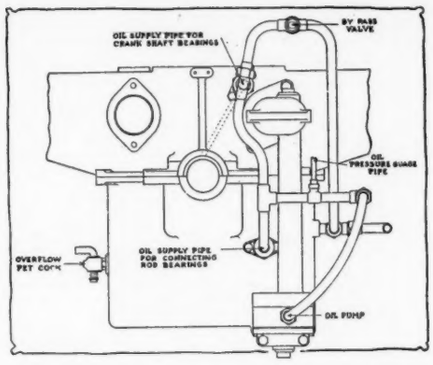

OIL SUPPLY PIPE FOR CRANK SHAFT BEARINGS
BY PASS VALVE
OIL PRESSURE GUAGE PIPE
OVERFLOW PET COCK
OIL SUPPLY PIPE FOR CONNECTING ROD BEARINGS
OIL PUMP

Fig. 5—End view of oil pump and piping

stronger joint is formed between the edges of the members.

Before welding, the metal should be scraped and cleaned and if the stock is more than .25 inch thick, it is advisable to chamfer the edges. Pieces that are of such shape as to undergo strains when heated at the fracture should be heated all over by placing in a charcoal fire, using natural draft. The temperature should be between 300 and 400 degrees below the melting point. This can be determined in two ways. The heat should be sufficient to melt the solder stick or cause a drop of water to sputter on its surface.

When this is done remove the piece from the fire and cover it with asbestos sheets leaving an opening where the weld is to be made.

The oxygen acetylene flame should be reduced or softened by using an excess of acetylene to a degree that will be indicated by the extension of the acetylene cone to 1 to 1.5 inches beyond the white cone. This excess of acetylene does not injure the aluminum but merely lowers the flame temperature to the most desirable point. Sufficient pressure should be used on the torch to force the melted solder well through the fracture so that a ridge of solder will be formed on the other side.

An iron rod hooked at the lower end should be used to puddle the solder into the crack and this rod should be wiped frequently so that it will not become coated. After the joint is made the piece should be turned over and the ridge of metal on the other side should be smoothed off by means of the torch and puddle iron.

The secret of a successful weld lies in making thorough preparations and in doing the actual welding with almost feverish haste. The solder should be applied as soon as the piece is removed from the fire and if the application of molten metal to the crack is not continuous until the work is completed the joint will crack on cooling.

After the weld is made is should be covered completely to protect it against drafts and allowed to cool slowly.

2—A description of the Entz transmission appeared in the Jan. 8 issue of THE AUTOMOBILE and specifications of the principal American cars in the Jan. 1 issue.

3—The A. L. A. M. horsepower formula is now known as the S. A. E. In this formula the horsepower rating is obtained by squaring the bore, multiplying by the number of cylinders and dividing by two and one-half.

A List of Kerosene Carbureters

Editor THE AUTOMOBILE:—Kindly advise what carbureter to use low grade gasoline or half kerosene and which is the best $1,000 automobile in your opinion for business?

Curacao, Dutch West Indies. E. S. ECERTSZ.

—It is against our policy to recommend any particular article for the reason that it is impossible for us to know accurately the relative merits of all the products in a given class. For instance in order to be able to say confidently what is the best automobile for $1,000 we would need to test out several models of each machine in this class, under varying road conditions, loading and speeds. And after we were all through, instead of finding that one particular machine suited all conditions the best we might find that one make would give most satisfactory service in a hilly country and another would be a better car if a fast machine were wanted. In other words, the question of what is best depends not only on the absolute merit of the machine itself but on personal taste. Therefore it is evident, that to give an opinion that would not do an injustice either to manufacturer or prospective customer it would be necessary to go to great expense in running tests and even then our decision might not take into account the personal factor and since this is the case it is only fair for all concerned for us to assume a neutral attitude and not recommend any particular machine.

Below is a list of carbureters designed for using kerosene and by obtaining catalogues from the concerns making them you can undoubtedly judge which one will best suit you.

Barnard Mfg. Co., 3300 Maple avenue, Los Angeles, Cal.

Camden-Anchor Rockland Machine Co., Camden, Me.

Chambray Carbureter Co., 7707 Woodward avenue, Detroit, Mich.

W. D. Deppe, 127 Duane street, New York City.

Distillate Motor Equipment Co., San Francisco, Cal.

Electric Renovator Mfg. Co., Pittsburgh, Pa.

G. C. Vaporizer Co., of America, 1790 Broadway, New York City.

Master Carbureter Co., Los Angeles, Cal.

Russel Eureka Carbureter Co., Rudd, Ia.

Universal Oil Converter Co., 447 West street, N. Y. City.

Wilcox-Bennet Carbureter Co., 1030 Marshall street, N. E. Minneapolis, Minn.

Holley Bros. Co., Detroit, Mich.

Ray Harroun Co., Indianapolis, Ind.

The principal cars listing between $900 and $1,100 are given below and you should be able to make a satisfactory selection from these after a little study.

Buick B-24	Roadster	$950
Buick B-25	Touring	1,050
Continental	Touring	1,000
Detroiter	Touring	900
Dispatch	Touring	900
Empire	Touring	900
Hupmobile	Touring	1,050
King, B	Touring	1,095
Krit, L	Touring	950
Marathon	Roadster	925
Meteor	Touring	950
Monarch	Touring	925
Overland, 79	Touring	950
Paige	Touring	975
Partin-Palmer	Touring	975
Studebaker	Touring	1,050

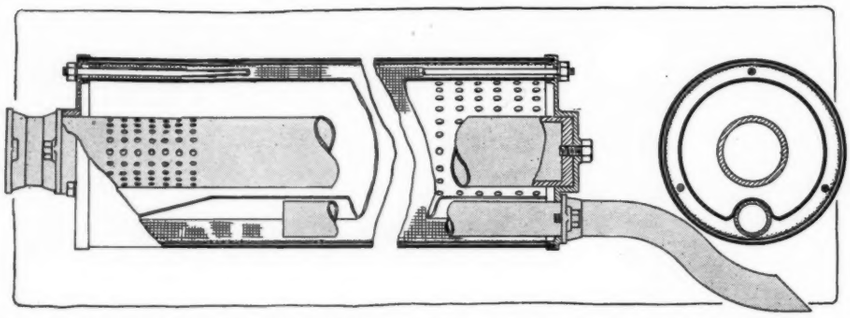


Fig. 1—Sectional view through Waldon muffler on Packard car

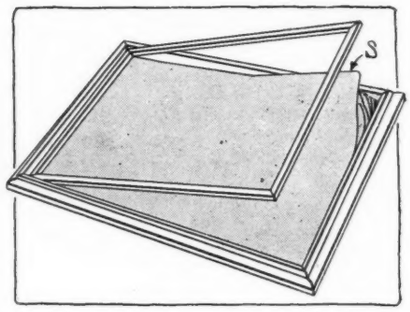


Fig. 2—Hughes patent drip pan and removable paper sheets

Patents Assigned Packard and Klaxon

S. D. Waldon Secures Patent on the Packard Muffler—M. R. Hutchison Makes Horn Improvements in New Patent—Hughes Drip Pan

SIDNEY D. WALDON has assigned to the Packard company Patent No. 1,094,105, covering a muffler which is of the design substantially used in the Packard car for the past several seasons. A sectional view of this muffler is given in Fig. 1, and it should be mentioned that it is the same as that used in the muffler test conducted by Joseph Tracey in his Rutherford laboratory under the auspices of the Automobile Club of America to determine the actual gain in power by the use of muffler cutouts. Both these tests showed nothing in favor of cutouts and were reported in THE AUTOMOBILE for March 12, 1912, page 738, and April 11, 1912, page 893.

The entire object of the particular construction of this muffler is to render it as simple and accessible as possible. Referring to the longitudinal section and transverse cross section, both of which are illustrated in Fig. 1, it will be noted that the muffler consists of an outer cylindrical casing which is generally lined with asbestos. Within the casing there are two internal tubular members concentric with the casing one within the other. These are all closed by end cover plates, except the forward end of the innermost tubular member which projects through the forward end of the muffler and connects with the exhaust of the engine.

The exhaust gas enters the inner tubular member, passes through the perforations shown and into the outside cylindrical casing. From here the gas is passed through the several series of perforations in the rear end of the outer tubular member, thus being further broken up and passed into the annular space between the outer tubular member and the casing. The outer tubular member is bent inwardly along one of its sides as shown in the drawing for the purpose of slightly enlarging the annular space in order to accommodate the outlet tube.

Mr. Waldon has been allowed two claims on this patent, the first of which specifies a muffler comprising a plurality of concentrically arranged cylindrical elements, end plates therefor and an outlet pipe extending through one of the end plates and into the space between said cylindrical elements. The inner cylindrical element has an inwardly bent portion as described.

Another Klaxon Patent Allowed

Miller Reese Hutchison, inventor of the Klaxon horn, has been granted Patent No. 1,094,403, which has been assigned to the Lovell-McConnell Mfg. Co., maker of this warning signal. This patent embodies improvements in warning signals which render the sound less harsh and at the same time reduce the wear and tear on the diaphragm by employing a non-rigid elastic connection or coupling between the driver and the diaphragm.

Referring to Fig. 3, in which the details of this invention are shown, it will be seen that a piece S, has been put between the driver W and the diaphragm D. The piece S carries the stirrup which is acted upon by the ratchet wheel. This intermediate device is so arranged that the thrust of the driver is received by it and the inventor also claims that at inharmonious speeds it partially absorbs and partially transmits to the diaphragm the energy that is supplied to it by the driver. At harmonious speeds it is claimed that practically all of the energy is transmitted to the diaphragm and little or none of it used in the elastic coupling device. In this way the abruptness with which the diaphragm is set in motion is lessened.

Improves Tone Quality

Various means for attaining the same end have been the subject of prior patent applications by the same inventor in which the cushioning connection may be either coupled to the diaphragm or merely in contact therewith. The present invention, however, involves that type in which there is a transversely flexible member adjacent to one surface of the diaphragm and preferably not in contact with the vibrating portion, except where it is secured to it. As shown in the illustration, the connection is at about the center of the diaphragm. The inventor states that by having the driver contact with this cushioning member at a point removed from that at which the cushioning device is secured, the force will be imparted to the diaphragm through the intermediate portion of the elastic connection by more or less modified or tempered thrusts rather than by blows imparted directly to the diaphragm. The natural outward and return vibrations of the diaphragm may be completed with less interference and less abrupt change by reason of the slight bending or yielding of the connecting member. This condition of affairs would naturally improve the quality of the note, especially at starting and stopping periods, when the thrust of the driver would be out of synchronism with the diaphragm.

Seven claims relate to the means for imparting the vibrations to the diaphragm and the manner of connecting the thrust of the driver to the diaphragm. Claim 1 specifies a bar disposed closely adjacent to the diaphragm extending radially from the center to the periphery, said bar having a portion bent toward the diaphragm tightly clamped thereto and the remainder being spaced slightly from the

diaphragm. This claim also includes the clamping of the other end of the bar and the wear piece on it. Claim 2 deals with the casing including two clamping members to clamp the diaphragm and the bar. Claim 3 mentions an impact member for delivering thrusts at a point removed from the center of the diaphragm. Claim 4 specifies a rotary impact member having engagement with the wear piece on the bar. Claim 5 covers a wear piece that in full operation will have its movements bearing a definite relation to the natural swing of the diaphragm. Claim 6 relates to a motor adapted to vary its speed in accordance with the work done and of sufficient power to start and drive the contact cam up to speeds corresponding and harmonizing with the natural spring of the vibratory parts. Claim 7 mentions the cam-engaging portion being spaced away from the diaphragm and slightly movable toward and from the same to cause the diaphragm to swing continuously with normal speeds but cushioning independent movements which interfere with the tone.

Secures Patent on Drip Pan

Arthur E. Hughes, junior partner of the Foss-Hughes Co., of Philadelphia, Pa., which handles the Pierce-Arrow car in that city, has secured a patent on a drip pan which he is now marketing as an accessory. This pan, which is illustrated in Fig. 2, comprises a frame holding a series of removable sheets which can be withdrawn after they are soiled. The sheets S are composed of paper of such composition as to be water and oilproof and the dimensions of these sheets are such that they will fit snugly into the frame. Each sheet is removed as soon as it has collected enough liquid to cause it to run to the edges of the container. Five claims have been allowed on the patent covering the use of the rectangular or open holder frame and the series of removable sheets.

—

Dome-Shaped Piston-Valve Motor Patented by Cameron

AN interesting four-cycle piston-valve motor has recently been patented by E. S. Cameron and a company is being formed in New York City to take up its manufacture on a large scale for automobile, stationary and marine engine work. The men interested in this new motor are also the moving spirits in the C-S-C Engine Co., which recently put an air-cooled cyclecar motor on the market. This motor was also designed by Mr. Cameron.

The feature of the new motor (Figs. 1, 2 and 3) is a dome-shaped piston-valve that is actuated by an overhead cam. This valve uncovers both the intake and exhaust ports. At A, Fig. 1, is shown the chamber into which the exhaust passes when it issues from the cylinder and the intake passage is shown at B. The positions of the valve for suction, compression, firing and exhaust are shown in order, in Fig. 4, and the arrows indicate the direction of gas flow during the performance of these operations. It will be noted that the charge must pass through the chamber housing the cam mechanism before it passes on to the combustion chamber.

The object of sweeping the piston-valve with the in-rushing gases is to cool the valve and the small period of time that the gas remains in this chamber also aids in vaporization.

For convenience in manufacture, the valve slides in a bushing instead of moving in direct contact with the cylinder walls.

As is clearly indicated, the cam bears against a roller on the valve and this roller is held in contact with the cam at all times by means of the coil spring. The cam-shaft is driven at half crankshaft speed by a silent chain.

This patent covers an entirely new form of silent valve, which the owners claim is superior to any form of silent valve that has been brought out up to the present time. The valve allows very large port openings to be used and requires a very small proportion of the engine power to operate it, the action being almost automatic; that is, the movement of the valve is assisted by the varying pressures in the cylinder. It is stated that it is very easy to lubricate and this is a special advantage in gas producer work.

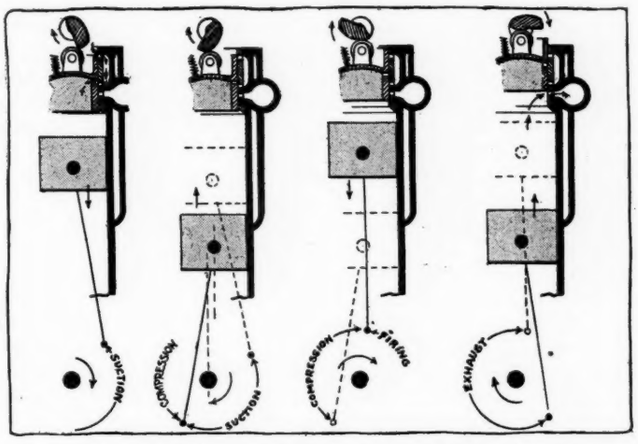


Fig. 4—Diagram of Cameron motor showing position of mechanism for the various functions of the cycle

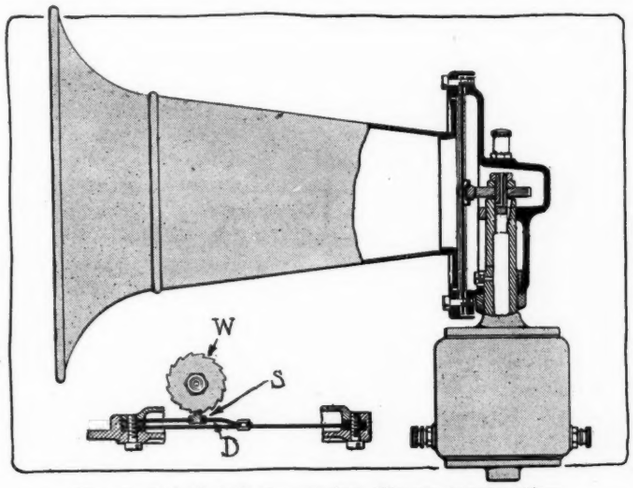
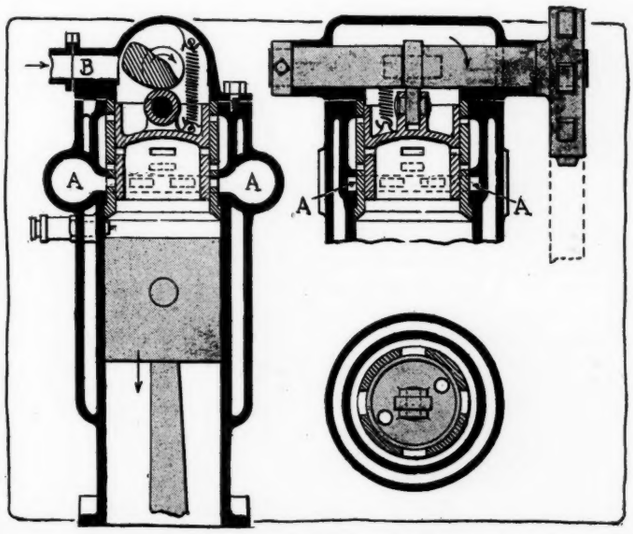


Fig. 3—Latest patent covering Klaxon construction



Cameron motor. Fig. 1—Left Transverse section through cylinder. Fig. 2—Upper right—Longitudinal section showing cam mechanism. Fig. 3—Lower right—Horizontal section

New Books for the Engineer

Two New Handbooks of Great Value and a New Edition of the Modern Gasoline Automobile

THE books received recently are of more than ordinary interest and value. Machinery's Handbook and the Handbook for Machine Designers and Draftsmen, will be found almost indispensable to the engineer. Then there are two books that will appeal to the ordinary motorist. The Modern Gasoline Automobile is an up-to-date work and should not fail to interest the layman and the book on Rubber and Rubber Planting should find a large market because of its general appeal.

MACHINERY'S HANDBOOK, THE INDUSTRIAL PRESS, New York City. 1,400 pages; liberally illustrated. Leather, $5.

Every great trade should from time to time collect, systematize and publish its established principles and working data. This handbook renders that important service for the useful arts of machine design, construction and operation.

For 20 years *Machinery* has been collecting material indispensable for such a handbook and the best of it is in this book. In addition, there is a great deal of material published for the first time, and much valuable information gleaned from hundreds of books and catalogues that were searched to amplify or complete particular subjects.

Everything that the shop man may require to know will be found somewhere in this book. An idea of the thoroughness with which it covers the field and the great number of facts that it contains can be obtained from the fact that there are over 4,500 separate items listed in the index.

The first 300 pages are devoted to mathematics, there being nearly a hundred pages of mathematical tables, the principal formulas of arithmetic and algebra, logarithmic tables and logarithms, geometrical propositions and problems, and formulas of theoretical mechanics.

Following this comes a treatise of almost equal length on the strength and properties of steel wire and rope, for strength tables and formulas for various types of beams and loading. Riveting and riveted joints are then considered and the strength and properties of steel wire and rope, formulas and tables of spring design and the torsional strength of shafting are discussed.

Laws and tables concerning friction are given and the properties of plain, roller and ball bearings are discussed and useful formulas appended. Data and formulas giving the design of keys and keyways, clutches and couplings, and friction brakes follow. Cam design and cam milling are considered.

The next 200 pages are given over to various forms of gearing for power transmission. The design of spur, bevel, worm, spiral and herringbone gearing is gone into thoroughly and many valuable tables and formulas are given. Belts and pulleys, machine-tool drives, rope transmission and chain drive, crane chains and hooks are the subjects that follow.

As is to be expected, a great deal of space is given to machine tools, to their care, adjustment and operation. The speeds and feeds for machine tools are given and the subject of tool grinding discussed.

The next few chapters deal with the treatment of metals. The processes of hardening, tempering and annealing are described thoroughly, and methods for testing the hardness of metals are given.

The methods employed in foundry and shop are described and chapters are given to the extrusion of metals and die-casting.

The various forms of brazing and welding are taken up and the method of procedure and the fluxes to use are given.

A large amount of space is given to the care of electrical machinery and the power required to drive machine tools, and the book closes with chapters on weights and measures and the principal patent law regulations.

THE MODERN GASOLINE AUTOMOBILE, 1914 edition, by Victor H. Page, M. E., the Norman W. Henley Co., New York City. 816 pages; illustrated. Cloth, $2.50.

While the new edition is almost identical with the 1913 edition owing to the highly developed state of the art, it has been found desirable to prepare much additional matter in order to keep pace with the progress of the industry. The entire work has been thoroughly revised and a number of corrections made in the text. Much supplementary matter has been added to ignition, the action of magneto generators and basic principles on which they operate and therefore this subject should be more easy of comprehension. Entirely new material has been added on: tractors in the three- and four-wheel forms; cyclecars; combustion; gasoline-electric drive; front-wheel and four-wheel steering systems and other important developments in power-propelled vehicles.

The discussion of power transmission has been augmented by the consideration of the skew bevel gear and two-speed direct drive. The subject of electrical motor starting systems has been considered at length and all the leading systems and their components described. A discussion on ball and roller bearings, their maintenance and installation, has also been included and a number of other features of timely interest such as the latest types of gasoline and kerosene carbureters, cyclecar power plants, the Fischer slide valve motor, detachable wire wheels, etc., have been added to bring the work thoroughly up to date. Many cuts have been made to illustrate the new matter and the treatment of some of the subjects changed a trifle upon the advice of various educators to permit the work to be used to somewhat better advantage in teaching classes in automobile engineering in various technical schools.

HANDBOOK FOR MACHINE DESIGNERS AND DRAFTSMEN, by F. A. Halsey, B. M. E., McGraw-Hill Book Co., New York City, 494 pages; cloth.

By the Editor Emeritus of the *American Machinist*, this book is a masterly work based on the ripe experience of the author both as an engineer and an editor.

The first chapter takes up the mechanical principles of design and chapters follow on plain bearings, ball and roller bearings, shafts and keys, belts and pulleys.

Then come chapters on various forms of gearing, rope drive, chains, brakes and friction clutches.

The principles of hydraulics and the design of hydraulic machinery are taken up and the design of pipes and pipe joints described.

A chapter is given to a discussion of the power requirements of tools and their performance. Then follow chapters on cast iron, steel and various metal alloys. Very complete data on steam boilers, steam engines, gas engines and air-compressors are given and the closing chapters of the book are devoted to mechanics, the strength of machine parts, weights and measures and mathematical tables.

RUBBER AND RUBBER PLANTING, by R. H. Lock, Sc.D. G. P. Putnam's Sons, New York City. 245 pages; illustrated; cloth, $1.50.

Written by a well-known authority on botany and rubber, this volume deals with the history of the use and cultivation of rubber, its botanical sources, the botanical physiology of rubber and latex, the diseases, chemistry, and manufacture of rubber and with rubber planting.

Beginning with the history of the use and cultivation of rubber, the author then touches upon the botanical sources

of rubber and the physiology of latex, production with special reference to tapping experiments.

A chapter is devoted to a description of planting operations and another to harvesting. Details concerning the factory work on the estate are given.

The pests and diseases of the rubber trees are described and closing chapters treat of the chemistry of rubber and the manufacture of rubber goods.

LIST OF AUTOMOBILES published by the Commercial Union Assurance Co., 55 John street, New York City. Paper; 260 pages.

In this volume a complete list of automobiles showing the model, type of body and list price of all American machines and the principal foreign ones as well is given. As the list includes every model up to the present time, it should be of great interest to those interested in the automobile trade.

THE IRONMONGER METAL MARKET YEAR-BOOK for 1914, published by the Ironmonger, 42 Cannon street, London; 103 pages; cloth, 2/6 net.

This book, the eighth edition, contains the prices of the various metals for the year 1913 and is an indispensable reference work for those who, as traders or manufacturers, are interested in the cost and production of the principal base metals of commerce.

It contains the closing prices per ton of best selected electrolytic and sheet copper for every day of the year just passed and also a great many useful figures concerning the production of copper for the last quarter century. Similar information concerning lead, tin, pig iron and steel is given.

THE POLYTECHNIC ENGINEER, published by the students of the Polytechnic Institute, Brooklyn, N. Y., cloth, $1.25, 138 pages, liberally illustrated.

While this book is published under the auspices of the students of the Polytechnic Institute, it contains many articles of interest and value to the engineer.

The paper on oscillation transformers should be of interest to the advanced student of electrical devices. Another paper deals with the general subject of lattice bars applied to structural shapes, and some interesting formula are given. An interesting article discusses the use of vector diagrams of electrical discharges and another takes up the predetermination of voltage in electrical machinery.

A paper of interest to the factory man is on the diffusion of light by mechanical means.

Inclosed Trailer Drawn by Velie for Catholic Church

A CATHOLIC church, in the form of a trailer to a Velie roadster, has just been completed for the Catholic Church Extension Society, which will use the church for missionary work in Texas. Brownsville, Tex., is the place to which the church will be shipped and from there overland work will be done over a large area.

The trailer, built by Jacob Press & Sons, Chicago, Ill., is attached to the Velie roadster, which is a regular model L, by a fifth wheel in the ordinary manner. The trailer is divided into two compartments, one in the rear containing the altar and that toward the front the priest's quarters. The latter contains all the necessary equipment for the erection of two berths 3 feet wide, one above the other, leaving sufficient space at the side to dress and undress. These berths are erected by placing two wooden beams into sockets fitted into the walls for the purpose. A closet at one end is sufficiently large to contain a tent which is used as a covering for the congregation, bed clothes and the priest's vestments. The compartment is fitted with electric lights operated by the generator and storage battery in the chassis. On the whole, there is nothing omitted in this compartment which would be necessary for the comfortable housing of two persons.

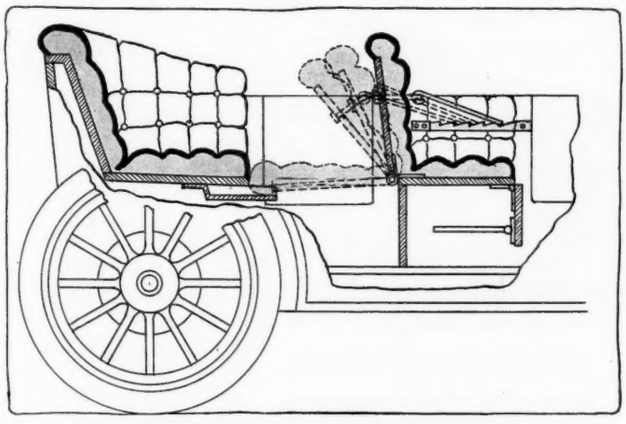
A platform in the rear may be raised or lowered easily and from this the mass is conducted. A flight of steps lead from the platform to the ground and the whole may be neatly folded and the rear doors closed. The trailer may be disconnected from the roadster by a cranking arrangement on the side. One crank raises the trailer sufficiently to allow the roadster to move from under it, while the other crank operates a steel jack which is lowered so that the trailer may rest on the ground. The whole is approximately 30 feet long.

Back of Automobile Seat Forms Couch

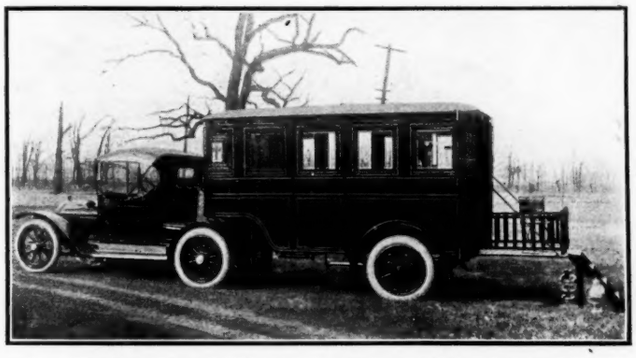
An invention upon which a patent has recently been granted gives a neat method of changing the back of an automobile seat to perform the office of a couch or bed. The increasing use of the automobile as a camping vehicle has been the basis for many schemes of this nature and the latest one involves the provision of hook rods or hangers for holding the seat back at any angle desired. When the seat is allowed to fall all the way back it can be put in a plane in alignment with the front and rear seats so as to convert the body into a couch. When the seat back is disposed in such a plane, a spring arm is put under tension. This arm constitutes means, when pressure is relieved upon the back, to partially throw the back upward, so that it may be easily grasped and disposed vertically.

Another feature of the invention is that the seat back hangs on a hinge which may be detached instantly, raising it horizontally with rachet bars above both front and back seats, held by the spring-arm at rear, forming a table.

There is also an attachment which hangs to the front seat cushion which may be raised horizontally, if desired, to produce a greater length of couch.



Patent body that can be used for bed



Catholic church trailer drawn by Velie roadster

The Engineering Digest

Principles and Design Details Shown in Prize-Winning Benzol-Gasoline Carbureters in Germany

REGULATION BY AIR IN JETS MOST PROMINENT

RECENT improvement of carbureters in Europe has not been concerned with refinements, as a rule, but with the development of the ways and means for utilizing the entire force of the air current produced by the suction from cylinders for the atomizing and evaporation of the fuel and at the same time guiding and baffling the air in such manner that neither a wide-open air-channel nor a strong suction will enrich the mixture but on the contrary will make the mixture as lean and economical as may be consistent with reliable ignition. The trend of improvements is not expressed in these words by the commentators on the situation in the technical press of Europe but is described as a fight between two leading principles, one first championed, it is said, by the Longuemare firm, but now carried much farther in other makes, the other first expressed in the patent specification for a Zenith carbureter. The abolition of additional air intakes, and of movable parts, coupled with the introduction of air into the interior of fuel jets constitutes the earmark of the new carbureters developed from the Longuemare type; and the development of the Zenith type, while starting from a different beginning, seems to be tending toward similar means for the regulation of the mixture, especially the use of air in the jets, as will appear more clearly in the following, but some innovations in the German-made Zenith carbureter used in the recent German carbureter contest are still kept under cover, leaving some doubt on this point.

The need of operating with benzol fuel, which requires more air than gasoline and a more energetic atomizing of the mixture, is believed to have had much to do with the development of the two new types—which in the end may prove to be only variations of one type, strictly speaking—but it is noted as particularly significant that all the carbureters in the German contest, which has been the most important event during the past year for producing data on the reliability, economy and convenience of different carbureter designs, could be operated perfectly well with gasoline on the same adjustment which gave the maximum economy in each case with benzol; no functional disturbances arose, but, in order to obtain the maximum economy with gasoline also, another adjustment would have been required. Under the rules it was not essential that the economy with gasoline should prove as pronounced as that which perhaps could be obtained with a carbureter designed for use with gasoline only.

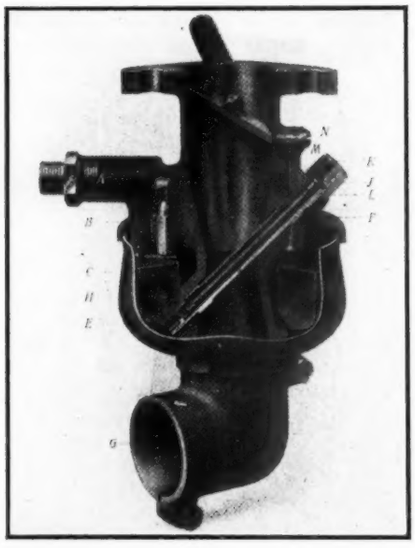


Fig. 1—Pallas carbureter; reference letters explained in text

As the preliminary account of the results of the German contest, given in THE AUTOMOBILE of April 16, page 827, was based on vague early reports, some additional data with regard to the four carbureters for which prizes were awarded, are offered herewith from later information (though still incomplete, since the official report on the laboratory tests is still withheld):

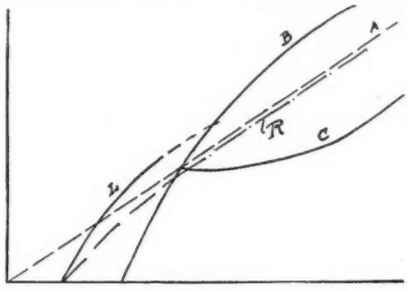


Fig. 2—Diagram of Pallas fuel feed, approximate
A—Theoretical curve
B—Influence of main jet
C—Influence of interior tube
L—Influence of by-pass
R—Resultant curve

Three Systems

It is first noted that the three first prize-winners, the Pallas, the Zenith and the Farewell, brake the fuel feed and break up the fuel by means of air in the jets (though not by the same means or under the same conditions of operation), while only the fourth prize-winner, the Adler, has an automatic additional-air inlet system. Three other carbureters, which did not win, incorporated the same principle. Three other ones, also non-winners, had operative regulation of the additional air, and three, besides the Adler, had automatic regulation of this feature.

Pallas Construction

The greatest interest centers in the Pallas carbureter, because it is new and simple as well as most radical in principle and design details. In a Hansa car of 10-30 horsepowers this carbureter consumed only 11 liters of benzol for 100 kilometers of travel, and the car reached a maximum speed of 76 kilometers per hour in spite of very difficult road conditions. (The test was held in February, 1913, and the roads were covered with snow.) At the laboratory tests the best results are also unofficially said to have been shown by this carbureter. The larger features of the Pallas may be observed directly from the illustration, Fig. 1. The annular float is of the tipping type, hinged at one side near the very short needle valve, and moves almost without friction in the float chamber, so that wear of it is reduced to a negligible minimum. The combination jet F, which can be removed by the loosening of a single screw at its top, contains all the organs which influence the composition of the gas mixture. It consists of two concentric tubes between which there is a small annular space. The external tube has screwed into its lower end a fuel-gauge E, which can be exchanged for one

of different aperture for different motors; at the middle of the air conduit this tube has perforations and higher up other small apertures L registering with a bypass channel M in the carbureter wall which serves for starting and still-running. The inner tube is at its upper end connected with the atmosphere by means of an air-gauge I which leads air downward to small apertures near the fuel gauge entering here the annular space between the two tubes and mixing with the fuel. During normal running this mixture of fuel and air is drawn into the main air conduit of the carbureter through the central holes in the outer tube of the jet. The whole arrangement is protected against entrance of dust in the jet by the screen K, and the fuel is also filtered before entering the float chamber.

When the throttle O is closed or nearly closed, a strong suction is directed to the bypass channel, in the usual manner, and fuel is drawn up into it from the fuel gauge and becomes mixed on its way through the jet with a small amount of air which enters through the central apertures in the jet. The amount of mixture supplied in this way is regulated by the exchangeable screw N.

Diagram Fig. 2 gives an idea of the co-ordination of the different elements in this construction with reference to the fuel feed. In this diagram the amounts of fuel delivered per second from the different channels are carried as ordinates and the revolutions per minute of the motor, which are assumed to be proportionate to the depressions caused in the air conduit of the carbureter, as abscissæ. Apart from such factors as variable velocity of inflammation and the varying effect of the compression on the theoretically required capacity for fuel delivery of the carbureter, the curve of the theoretically required amounts of fuel with a progressive depression would be indicated by a straight line, diagonal of the rectangle of the diagram. The effective curve R of the fuel feed should approximate this theoretical curve A. As understood, this is not possible with an ordinary single jet, which does not act till a certain depression is reached and, on the other hand, gives a sharply rising curve B at strong depressions.

The practical object must therefore be to apply a brake on the fuel feed to the effect that (1) braking begins at a certain depression and (2) the enriching of the mixture at high depressions is prevented. This effect is obtained through the fuel gauge in combination with the air gauge of the inner tube of the jet. The influence of the latter is indicated by the curve C. The combination of the two curves C and B should give the effective curve R. The feed from the still-running device is indicated by the curve L, whose upper trajectory, however, cannot be determined, since the device goes out of operation at high motor speed.

Farewell Design

About the Farewell carbureter, shown in Fig. 4, it is stated that it is identical with the Longuemare FR type in all essential details. The Longuemare firm first announced the principle of utilizing air for moderating the fuel feed in a carbureter of Venturi type and uniting the channels determining the fuel feed and the air feed with an auxiliary fuel container in one easily exchangeable construction unit.

The two concentric jets 2 and 9 are connected by channel 10 with the float chamber 11 and also with the auxiliary container 20. (In another model of the carbureter the auxiliary container, instead of being located centrally within the float is arranged upon the outside of the float chamber). The auxiliary jet 9 ends inside of a small air chamber 15 located immediately below the rotary cylindrical throttle valve 12 which is mounted in two annular ball-bearings in the carbureter wall, to guard against wear. The illustration shows the throttle closed for still-running or starting, and it is seen that the suction takes effect, through channel 13 in the throttle valve, directly upon air chamber 15 and the mouth of jet 9. Chamber 15 is connected at its bottom with the general air conduit of the carbureter by the annular opening 17. The first effect of the suction is now to draw out the fuel contained in jet 9, in the annular chamber 2′, which is the tube of the main jet, in the channel 10 and in the auxiliary container 20, whereafter air enters into the latter through apertures 25, following into channel 10, 2′ and the apertures 7 of the main jet. Subsequently the auxiliary jet thus furnishes a mixture of fuel and air bubbles to chamber 15, where this mixture is further diluted by air from the general conduit, entering by 17.

By means of the throttle valve, the main jet can be switched gradually into action, the passage through the valve being provided with a carefully developed edge to graduate the proportions of the mixture obtained. During the normal running the auxiliary container 20 continues to supply air with the fuel entering channel 10; and if this channel and the jet 2, which is surrounded with a hot-air chamber, are sufficiently heated, a lively evaporation of the fuel takes place before the mixture reaches the main air current.

Zenith Has Untold Features

With regard to the principle of the Zenith carbureter, Fig. 4, it is remarked that this was announced by designer Baverey in German patent No. 189565. The essential point here mentioned is that the fuel composition is influenced by

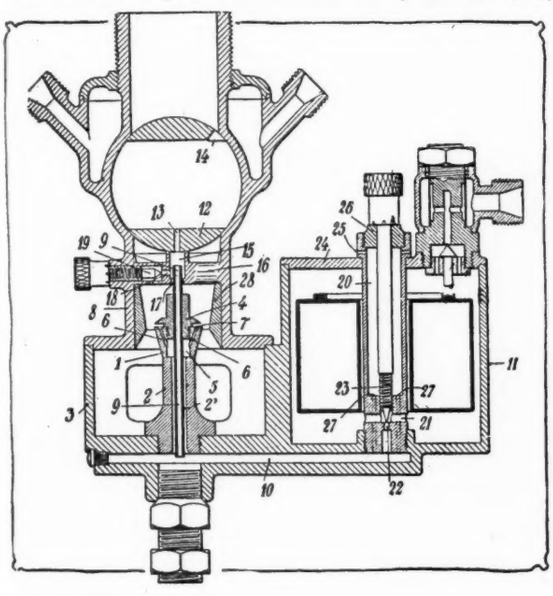


Fig. 3, left—Farewell carbureter, exemplifying Longuemare method for injecting air in fuel jets.

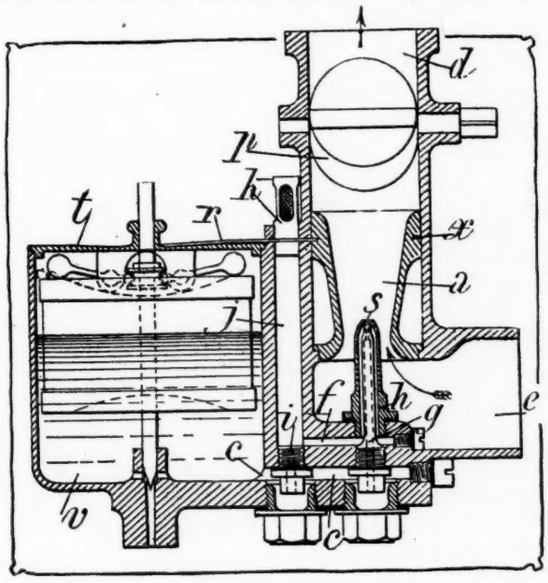


Fig. 4, right—Zenith type of carbureter; regulation by varying two fuel levels and diameters of two fuel passages

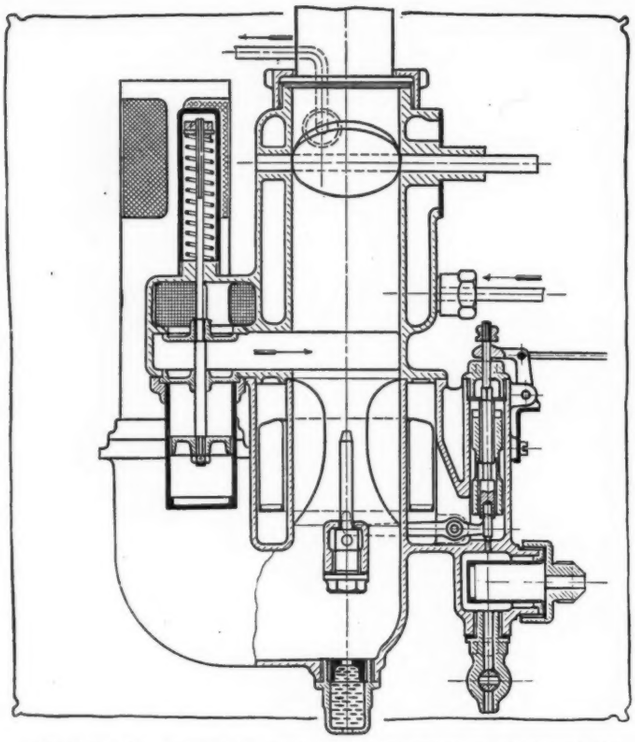


Fig. 5—Adler carbureter; with hydraulic brake on additional air

two factors which by varying demands upon the carbureter are varied according to different laws. To this end two jets *g* and *h* are provided, of which the first is supplied in the usual manner from the float chamber *v* through the conduit *c*, while the second obtains its fuel through conduit *f* from an auxiliary container *j* which in turn is replenished through a branch channel *i* from conduit *c*. As *j* is connected with the atmosphere at its upper end, it is sucked dry at medium and high motor speeds, and from this moment (when it is dry) a constant amount of fuel enters it through *i*, and this constant is supplied through the jet *h* to the mixing-chamber. A portion of the fuel entering the mixing-chamber is therefore regulated in amount by the difference in the level of channel *i* and the float level, and this portion is therefore not affected by the degree of depression in the mixing-chamber. This element in the construction thus prevents enriching of the fuel mixture at high speeds, in so much more pronounced degree the larger the section of channel *i* is in proportion to the section of the main jet.

For still-running a special channel, not shown in the illustration, leads from container *j* to the edge of the throttle valve, and this feature has been perfected in recent models. It takes now the form of an exchangeable inserted piece varying for different motors and is covered in German patent No. 265341.

The Zenith model in the contest was changed in some details of which nothing definite may as yet be said in public. It is known, however, that one experimental feature was a slide valve by which the depression in the auxiliary container can be regulated for still-running. This has special reference to the use for benzol.

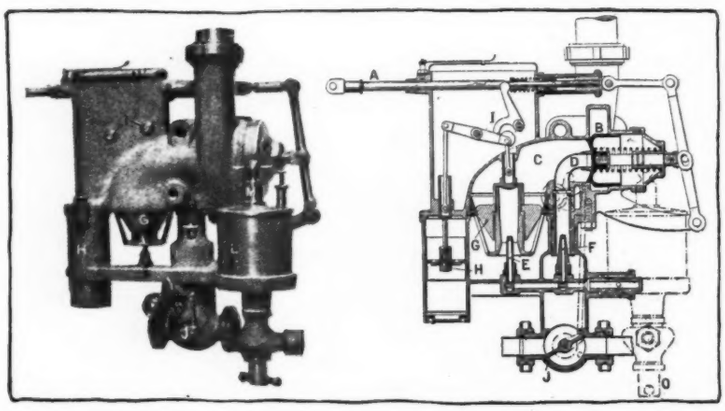
The Adler

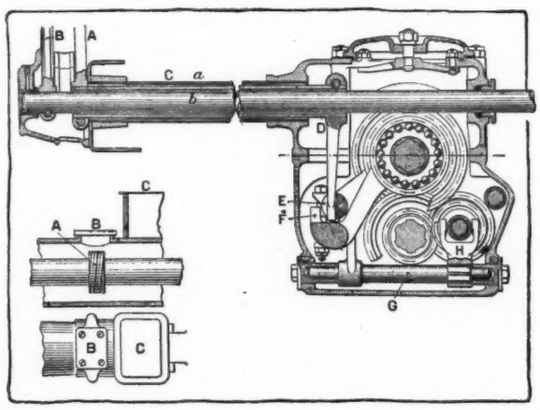
The Adler carbureter is shown in Fig. 5, after an illustration in Dr. Riedler's *Wissenschaftliche Automobil-Wertung*, second volume, said to represent accurately the carbureter used in the contest. It has in common with the Pallas the float chamber arranged annularly around the main jet and air conduit, but works, as mentioned before, with additional air automatically regulated. The regulation is effected by the movements of a poppet valve moderated by a hydraulic brake underneath it. The additional air enters above the jet and is therefore not a suction-creating but a suction-reducing element with regard to the fuel feed and the fuel-mixing—unlike the arrangements serving these purposes in the other prize-winners. The fuel discharge from the main jet is directed against a mushroom atomizer which is rilled along its outer edge in order to carry surplus gasoline near to the air current and obviating spilling. (Cut does not show this).

Entirely outside the main carbureter there is arranged an auxiliary carbureter for the starting and still-running. A small tubular fuel-container below the float level is here supplied by means of an adjustable sleeve upon the needle valve regulating the level in the float chamber, and a tube dipping into this container discharges fuel at the edge of the butterfly throttle.—From *Der Motorwagen*, March 31, and *Automobil-Rundschau*, April 15.

Renault's Reactionary Carbureter for His Six-Cylinder Motor

AMONG new models of six-cylinder cars in Europe the 40-horsepower Renault holds a place close to the center of the stage owing to the peculiar and recognized genius of its maker, in whom a forceful intuition in matters of engineering and mechanics is blended with a long-headed commercial shrewdness and conservatism in matters of style and appearance. A new carbureter and a new gearshift are the principal features which attract attention in the new model, but it may also be noted that both front and rear springs, which are perfectly flat, are equipped with hydraulic rebound checks and that attachments are provided for the convenient installation of electric lighting and a speed indicator. Ac-





Figs. 6 and 7—Renault six-cylinder carbureter. Fig. 8—New Renault gear shift. Fig. 9—Provision for mounting optional speed indicator

cording to illustrations of the car, these provisions include a generator mounted in front of the motor upon a prolongation of the aluminum crankcase, a storage battery supported on a bracket on the inside of the right-side frame-reach and a driving connection for a speed-indicator, the latter being shown in Fig. 9.

Fig. 6 and Fig. 7 show clearly the construction of the carbureter, in which the number of movable pieces is in sharp contrast with other modern designs, the accepted tendency being to avoid all other control than that of the throttle valve and to dispense with secondary air inlets, as shown through the recent contest in Germany for carbureters equally adapted for benzol and gasoline fuel. In the Renault carbureter, for six-cylinder motors, each of the two jets has its own mixing chamber, the chamber for the still-running jet being concentrically inside of the larger chamber for the main jet, while the slide-valve throttle *b*, Fig. 7, determines by its position which jet and chamber shall be in operation. The main jet works with a valve G for additional air, which is held down by its own weight and is raised more or less by the depression in the mixing chamber, all sudden movements being prevented by a hydraulic dashpot brake H. A special lever I connected with the throttle rod A prevents all suction around the main jet when the throttle is set for still-running.

The leading idea in this design is to keep all functions separate from one another by providing one organ for each of them. The two jets never work together. If there is something wrong about the additional air it can be remedied by adjustment of the additional air valve or the dashpot without influencing any other factor in the carburetion. J is the valve to a hot-air conduit by which air can be taken from a sleeve around the exhaust.

The control of the gearspeed changes, which in previous models was effected by means of a cam, is now exercised through lever A, Fig. 8, which is moved laterally and connects selectively with high or low gear or with the reverse through a hollow shaft surrounding the transmission-brake shaft *b* and lever D which commands the shifting forks. These shafts are carried in a hollow transverse extending from the right-side frame reach to the gearbox. In Fig. 7, E and F are the sockets of the shifting forks and GH the reverse-gear connection.

Fig. 9 indicates the provision made for a speed indicator. A is a worm upon its shaft in a sleeve, B a cap over an aperture in this sleeve, through which the gear of the indicator may be connected with the worm drive. C is a greasecup for the universal.—From *Omnia*, April 25.

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A METHOD for measuring rapidly changing temperatures is described by Doctor-Engineer Alfred Petersen in *Zeitschrift des Vereines Deutscher Ingenieure* for April 18. Registering durations of only .1 second, the method is applicable to research work in the construction of large internal-combustion motors—determining temperatures in cylinders, rates of heat-convection, etc.—and for approximate determinations in the case of automobile motors.

Rushmore Has 4.25-Inch Starting Motor

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Rates at .7 Horsepower—Can Be Used on Motors of Up to 4 by 5 Inches

THE Rushmore Dynamo Works, of Plainfield, N. J., has just brought out a new starter which weighs but 19 pounds. This machine has already been adopted for more than 10,000 moderate-sized cars by European manufacturers, according to the announcement of the Rushmore company. From a straight-out engineering standpoint this is a series wound electric motor which, by the Rushmore end throw arrangement, automatically engages and disengages with the flywheel gear. The machine will develop a maximum of about .7 horsepower and is intended for engines with cylinders of up to 4 by 5 inches. At its normal load of 85 amperes at 6 volts the machine shows an efficiency of about 72 per cent. Its diameter is but 4.25 inches. The De Dion company has ordered 4,000 of this new size.

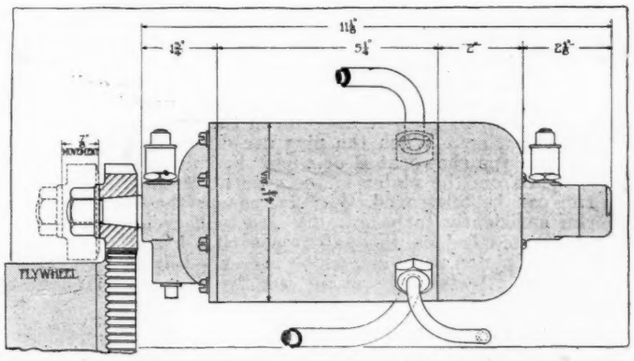
The lines along which this latest Rushmore starter is constructed under the name of Model D are very similar to the Model C machine, which is of larger size, weighing 30 pounds without the switch. The starting motor is only engaged with the flywheel when starting the engine. The principles of its construction are simple, the armature being held normally out of line with the pole pieces by means of a compression spring in the commutator end of the shaft. When the switch is closed the armature is drawn by the magnetic attraction of the pole pieces into its working position, thereby engaging the pinion with the flywheel. To hold the armature in position against the pressure of the spring it is made a little longer than the pole pieces, so that a certain amount of end pull is exerted while the armature is turning.

When the engine starts the motor is relieved of its load and following the principles of the series-wound motor, in which the field current decreases with a decrease in load, the current drops to practically nothing, allowing the spring to automatically push the armature and pinion out of action before the speed of the engine can increase appreciably.

No Skill Required for Operation

When the armature and pinion are out of action the current required to spin the motor is so small that the armature cannot be attracted back into its working position and therefore the pinion remains out of mesh with the flywheel and the electric motor spins idly until the starting switch is released. It does not harm to keep the starting switch in position for an extended length of time.

The Rushmore switch has two active contacts, the first partially short-circuiting the armature so that it rotates fast enough to make sure that the pinion will slip easily into mesh with the flywheel and the second puts the entire motor into action, cutting out a resistance in the main circuit. These movements take place upon depressing the foot-actuated button.



The new Rushmore starting motor, showing principal dimensions

Ten Patents Assigned To Universal Company

Rim Concern Holds Many Patents Covering Broad Claims on Transversely Split Type

WASHINGTON, D. C., May 5—Ten patents covering broadly many features of demountable rim construction have been issued today to E. K. Baker and J. A. Anglada and assigned to the Universal Rim Co. of Chicago. This concern, which is now entering a renewed period of activity in the rim field, has a firm grip on the rim patent situation, holding besides these ten patents just issued a number of other important issues covering the same situation. The patents are numbered, 1,095,770; 1,095,771; 1,095,772; 1,095,775; 1,095,776; 1,095,777; 1,095,778; 1,095,779; 1,095,953 and 1,095,996. The first three of these are issued to Joseph A. Anglada of New York, and the last mentioned to C. G. Hawley and E. K. Baker of Chicago. The others are all issued to E. K. Baker of Chicago.

Permits Rim Collapsing

Patent No. 1,095,770 covers a construction of the transversely split type of rim which permits the rim to be bent out of shape when removing or refitting a tire. The principle of the invention is illustrated in Fig. 1. As will be noted from the dotted lines at E, D, F, and A, the rim has been depressed from the position occupied at B, thus permitting the tire to be readily slipped off, owing to the decreased diameter of the rim. The object is to obviate the difficulty experienced in stretching the beads of the tire over the flanges of the rim.

The collapsible part of the rim is built up of two parts, F and E. These are connected by a resilient spring D, thus permitting the part E to be depressed out of round with F. The segment F is connected to the immovable half of the rim by the leaf spring A. In this patent the means of locking the part E at B are not covered, it being mentioned that any desirable type of locking device can be provided at this point. In operating the rim it is merely necessary to collapse it as shown by the dotted lines and to slip the tire on or off. The collapsing of the rim is aided materially by the flat springs connecting the segments.

Four claims are allowed on this patent covering the splitting of the ring at more than one point and securing the segments of at least one of these points by a strip of spring metal; the combination of the transversely split rim with a hole B in one end with a rigid latch or lug on the other end which snaps into the hole and a flexible connection of the segments.

Mentions Aligning Scheme

Patent No. 1,095,771 mentions an aligning and locking method for use on split rims. The patent drawings show two methods in which the locking device can be operated and both these methods are illustrated to the right of Fig. 2. The driving plates LL are carried on the felloe band and engage the driving lug M, which is carried on the demountable rim. The rim mentioned is of the transversely split type with the split running across at A or at D, according to which scheme is used. As the two schemes are similar except for the fact that in one the drive is taken through the pins B which engage the lugs C on one and in the other the driving lug M engages the plates L.

The method of operating a rim is to loosen the ordinary holding nuts around the circumference which permits the removal as a unit of the tire and rim in the usual manner for demountable rims. When the pins are disengaged from the lugs in the type shown at B or when the split driving lug is disengaged from the plates in the type at M the tire carrying rim can be telescoped, thus decreasing the diameter of the rim sufficiently to permit the tire to be removed. Ten claims are allowed on the patent covering broadly the use of the lugs, plates and pins, which are called driving factors because the stresses of taking the drive are transferred through them.

Provides Dust-Tight Connection

Patent No. 1,095,772 provides for a dust-tight method of joining the ends of a split demountable rim. The method of uniting the two ends of the rim has also for its object the prevention of creeping of the tire on the felloe. The method by which the inventor aims to accomplish these results is shown to the right of Fig. 1 in section. The inner tube is shown at A and connected with it is the usual method of mounting the valve stem. Below the valve stem plate is a bridge member or continuous plate which is provided with upstanding flanges or projections entering the sockets B formed in the split rim. This plate carrying the flanges extends transversely across the rim. Between the split rim and the plate B is the dust plate which has openings through which the flanges B pass. The split in the rim can be either square to the rim or oblique and may be so disposed as to pass through the valve stem hole in the rim. Surrounding the valve stem and engaging with its threaded portion is a washer fitting tightly against the bridge member B, which when screwed down tightly prevents the entrance of dirt or moisture into the tire at the point where the rim is split. Eleven claims covering this construction have been allowed.

Plate Across Split in Rim

Patent No. 1,095,775, the first of the E. K. Baker patents, covers a one-piece, transversely split rim which can be used with a non-stretchable bead tire. As shown at the upper right side of Fig. 3, the invention consists of using a metal plate extending across the split in the rim to form a continuous support for the tire and to provide clamping devices so that the ends of the rim can be contracted in order to place the tire upon it. The transverse cut across the rim is shown at A and the preferred construction incorporated the diagonal instead of the straight cut across the rim. When the rim is distorted, in order to reduce the diameter for the mounting of the tire it takes up a helical form, thus providing a means of easily putting on the tire. The rim itself is

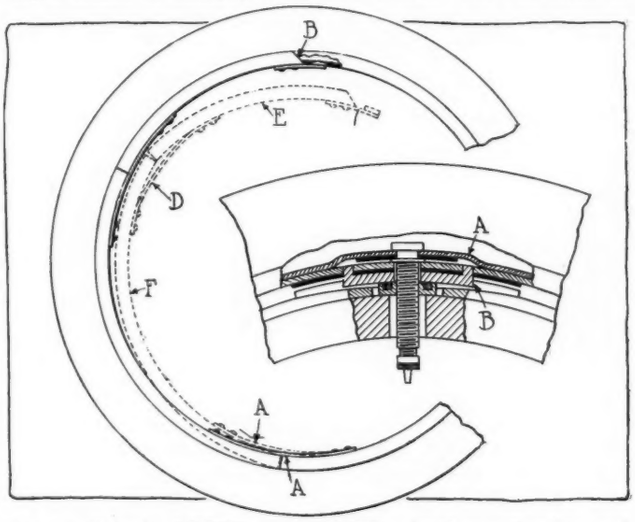


Fig. 1—Patents 1,095,770 and 1,095,772, showing collapsing and connecting schemes

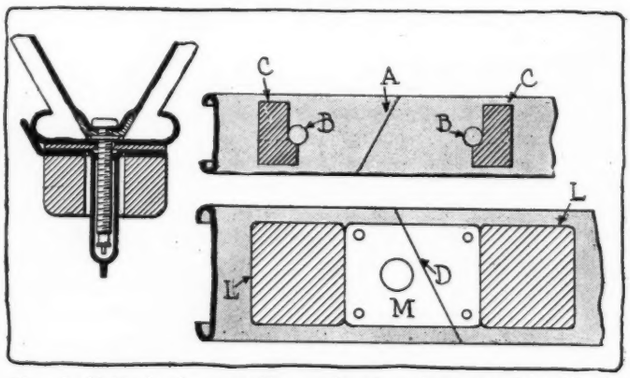


Fig. 2—Method of connecting ends of a transversely split demountable rim

held in position by the ordinary wedge lugs or fasteners and the object of the invention is to tie the ends together so that they cannot possibly expand when the rim is taken off the wheel.

For this purpose a metal plate B which extends across the split A is provided with the studs C which project through the corresponding holes provided in the ends of the rim adjacent to the split. One end of the rim contains the valve stem hole and the plate B contains a corresponding valve stem hole which registers when the rim is assembled. For holding the plate B in position a locking nut is provided which is supplied with a boss occupying the valve stem hole, through which the valve D passes. As will be seen from the drawing when the parts are assembled the two studs C fit in their corresponding holes in the part shown slightly removed from it and a driving connection is formed. As will be noted the felloe band of the wheel contains a hole which is much larger than the valve stem, and when the parts are assembled another driving connection is formed by the head of the nut around the valve stem fitting into the corresponding opening in the felloe band.

On this patent fourteen claims have been allowed, covering the construction of this joint and the use of the plate B incorporating studs which extend into corresponding holes in the wheel and felloe band.

Two Patents on Centering Device

Patent No. 1,095,776 and patent No. 1,095,953 are a pair, one covering the construction of the rim and the other of the wheel in connection with a device for automatically centering the rim upon the wheel when it is placed thereon. It is also claimed by the inventor that by the use of the method in these two patents, the number of parts necessary to operate the demountable rim is reduced. The construction covered in these two inventions is shown in Fig. 3 at the bottom right corner. Referring to these illustrations, it will be seen that the rim C is automatically centered by being brought up against the fixed flange on the inner side of the rim. On the outer side of the rim the wedged piece A is held by the through bolt B which when tightened will center the rim in place and automatically wedge it to a solid position. In order that more points of support would be furnished than would be given by the wedge bolts A around the circumference of the rim, a number of studs D are interposed.

These studs D are distributed circumferentially around the rim and the inventor sets out in the patent that he preferably alternates the studs with the fastening devices. Patent No. 1,095,776 deals with the construction of the wheel periphery incorporating this device while patent No. 1,095,953 deals with the construction of the rim.

Clamp a Permanent Part

Patent No. 1,095,777 is illustrated on the right side of Fig. 4. It provides a clamping device for a demountable rim of such form as to make the device a permanent part of the wheel structure and so arranged that they need not be taken off the wheel when a change of rim is to be effected. The device is also so formed that it will not be apt to be broken off should the wheel run against a curb. A view of the clamping device removed from the rim is shown in assembled form in the upper right cover of Fig. 4. It will be seen that the rim is held rigidly between the end pieces A and C. As shown in the sectional view the bolt B passes through a hole in the felloe close to the felloe band. The threaded nut for the bolt screws on the inner side of the wheel and the bolt screws back and forth in the nut. The clamping wedge C acts between the felloe band and the rim and serves as a driver to force the band on the wheel. The wedge works against one flaring side of the rim, while on the opposite side the flange of the felloe band takes the other side of the rim. The inner end of the wedge is pointed so that it may easily enter the space between the rim and the wheel. Seven claims are allowed on this patent.

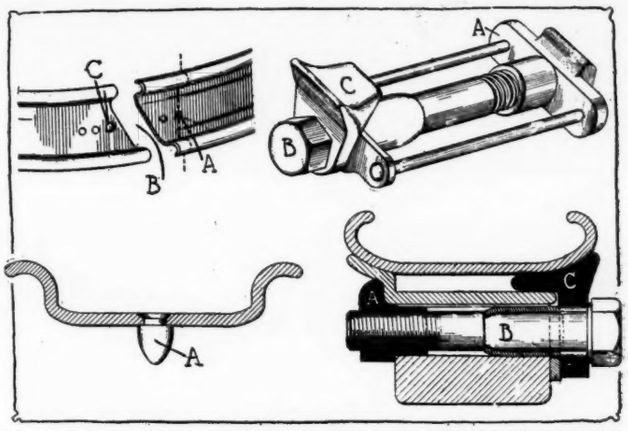


Fig. 3—Connecting means and method of wedging demountable rim of transversely split design

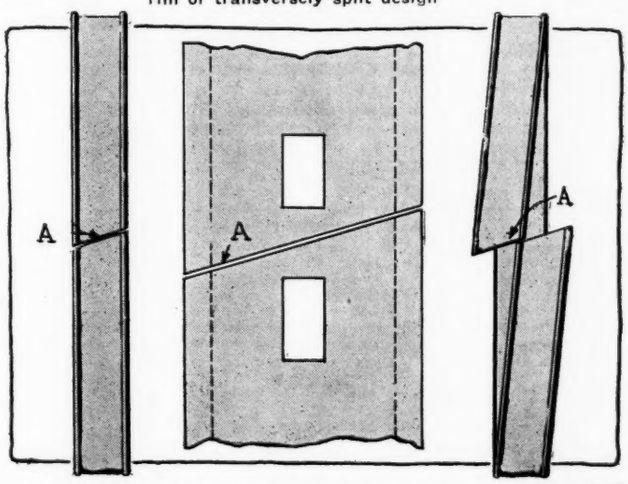


Fig. 5—Method of transversely splitting rim covered in patent No. 1,095,996

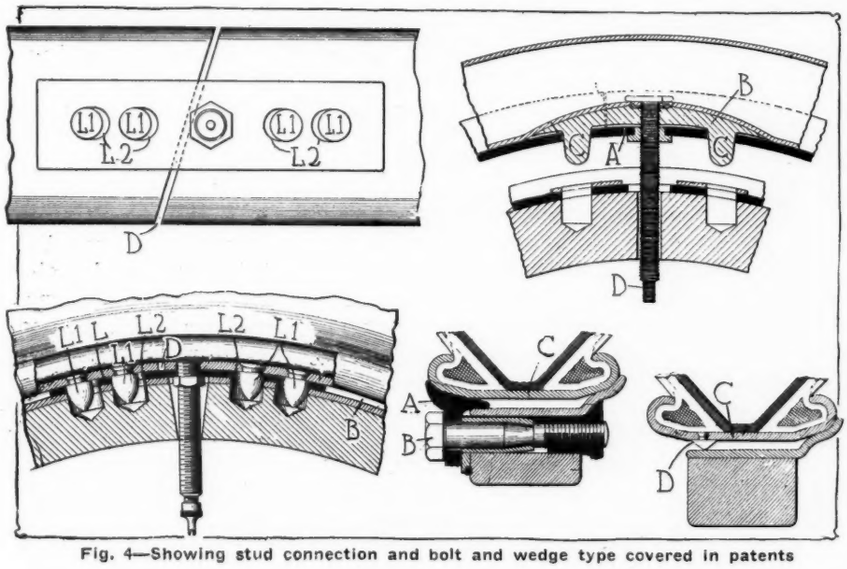


Fig. 4—Showing stud connection and bolt and wedge type covered in patents

Can Be Operated by Hand

Patent No. 1,095,778 deals with a split type demountable rim which may be taken out of the tire without the aid of contracting tools. For this purpose the construction shown in the left side of Fig. 4 is used. On each extremity of the split rim and extending inwardly are a series of studs A. These studs engage with corresponding holes in a curved plate which fits on the inside of the rim. On one end of the rim is a valve stem hole C and the rim end connecting plate bridges the split A on the inner periphery of the rim. The studs which project inwardly engage with the wheel and thereby provide a driving connection between the wheel and the rim. The curved plate also contains a hole for the reception of the valve stem and when the parts are as-

(*Continued on page* 1034)

The Automobile

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Aids in Merchandising

THE past 8 months have seen many automobile factories enter more intimately into the work of the dealer in disposing of cars than ever before. Heretofore many factories have limited their activities entirely to manufacturing and have been content to get the dealers' deposits and leave them entirely alone in selling their cars. The natural result of such a plan of operation was that the inexperienced dealer would find himself falling into the certain pitfalls of the merchandising field. One of the surest into which he was doomed to precipitate himself was that of giving too liberal allowances on used cars when taken in part payment for new ones.

Several makers during the past few years have instituted plans of co-operation with the dealer. They have aided him in wrestling with used cars; they have convinced him that even in merchandising used cars you cannot continue in business and pay more for a car than you can sell it for.

One progressive factory has kept a record of every used car taken in by all of its dealers. The cost of labor, new parts, overhead, etc., is recorded as is the final price, and the net result is that on several hundred sales, approaching near to the 1,000 mark, there has been a profit of over $25 shown on each car handled. This is coming out of the season on the right side of the ledger, the only question remaining in doubt being whether the most of this margin may be wiped out by after attention that these cars may have to receive.

Increasing Factory Efficiency

NOTHING can better indicate the greater stability that the automobile industry is attaining so far as manufacture is concerned than the greater increase in efficiency in many factories during the past year. The dull months of January, February and part of March gave many car makers their first opportunity of turning the searchlight of investigation on themselves and taking inventory of their efficiency factor so far as manufacturing is concerned. The net result is that in several, not a majority but a good percentage, more work is being done today with fewer workmen than a year ago.

This increase in production with a reduction in working forces does not mean that workmen are laboring longer hours, but rather due to improved internal factory systems it is possible for a workman to do more in 8 hours this year than he did in the same 8 hours a year or 18 months ago. To go further, the workman is not called upon to make a greater expenditure of physical energy today than a year ago.

Since the inception of the automobile industry production has been the one great objective with many concerns and the means whereby this has been attained have not been so well estimated and analyzed as with some older industrial organizations where profits may have been smaller and it was imperative to develop efficiency to the final syllable in order to show a proper balance on the right side of the ledger at the end of the year.

In one factory great monthly economies have been shown by cutting down the direct and indirect non-productive overhead. This has been a source of great trouble to several concerns, who in their rapid expansion have carried too many high-salaried officials representing their own or outside capital, which it was necessary to have in order to expand as demand seemed to warrant. With the industry crystallizing the opportune time has come to eliminate non-productive labor, by increasing the efficiency in the executive and clerical departments. Where economies of tens of thousands per month can be shown in this matter, it is not surprising that the present season finds some concerns robust and healthy who a year ago were laboring under financial difficulties because of the heavy yokes of non-productive help and poor factory organization they were carrying.

There are several factories in which the internal system of production has been largely altered during the past year, so that by an application of motion study hours are saved on some assemblies and fewer men employed. These new systems have been the natural development rendered imperative by the healthy growth of the business of growing concerns. General managers have been confronted with the one fact that it is cheaper to reconstruct the manufacturing system in many departments than to add to the factory floor space in order to produce a few more parts each year. By an application of scientific management several factories have been able to do the work of this year in a smaller space and with fewer men than last year. What could be a better indication of good management?

Laws Limiting Truck Weight Menace

A Maryland Bill That Bases Its Restriction on "Load Per Inch" May Be Construed as Affecting Tire Bearing Area, Thereby Harassing Many Vehicles Now in Use—Other Legislatures Also Active

By Douglass Burnett, Consolidated Gas, Electric Light and Power Co. of Baltimore.

BALTIMORE, MD., May 8—Several states have recently enacted provisions of motor vehicle laws, limiting the weights on tires, with the obvious purpose of protecting roadways against undue wear and tear. There is danger that, unless such provisions are carefully and intelligently considered, before enactment, a serious hardship will be placed on the vehicle industry that is not intended and that will lead to onerous restrictions on the use of trucks, both now in service and that will be purchased in future.

The Good Roads Commission of Maryland caused to be introduced in the State Legislature, within the last few weeks, a bill known as Senate Bill No. 189, which stated that the limit of load per inch in width of tire should be 800 pounds. The statement was such that the law might be construed to mean that the limit of weight was 800 pounds per inch in width of tire in contact with the road, whereas it was intended to refer to the limit of load per inch in the width of tire as rated by the manufacturer. Take, for example, a solid truck tire, rated by the manufacturer as one of 4 inches width, meaning the width at the base of the tire where in contact with the rim and as having a carrying capacity of 1,750 pounds. This is equivalent to a weight of 440 pounds per inch in width of tire as rated by the manufacturer, which is well within the allowable limit.

Maryland Bill Vague

However, the statement of the law as it appeared in the bill and as it was sanctioned by the Good Roads Commission of Maryland could equally well be interpreted to refer to the weight per inch in width of the bearing surface on the roadway. The particular tire referred to was measured and found to have a bearing surface of 1.5 inches width, equivalent to 1,166 pounds per inch in width on the road, which was beyond the allowable limit. The 6-inch tire rated by the manufacturer to have a capacity of 3,000 pounds, or 500 pounds per inch in width, was measured and found to have a bearing surface of 2.75 inches, 1,091 pounds per inch in width of tire on the road, and another was found to have 3.5 inches bearing surface, equivalent to 1,166 pounds per inch in width of tire.

It can easily be seen that unless the law is so worded as to make it clear that the former definition was the one intended, the motor truck owner operating a truck with this particular tire, might find himself within the toils of the law and be called upon to make radical changes in the equipment of his wagon, in order to bring it within the requirements.

The effect of the law as originally introduced in the Legislature, when enforced, would be to call in question the service of probably half the trucks in daily use in some places, and therefore, this condition represents a considerable menace.

Other States Should Go Slow

There are doubtless many in other states who will seek to have reasonable limits of weight for the protection of the roadways introduced into the laws of their states, and the purpose of this article is to caution all those interested to see that such provisions are made perfectly clear, to the end that no undue hardship to motor truck owners and the industry will result.

Looking over the laws of other states, we find the following provisions:

The Massachusetts Law, Acts of 1913, Chapter 803, Section 3, provides that a special permit must be obtained for the operation of any vehicle weighing 14 tons, or of any vehicle, "the weight of which resting upon the surface of said highway or bridge exceeds 800 pounds upon any inch in width of tire, roller, wheel, or other object." It also states that such permits may be limited as to time and as to particular roads and bridges which may be used and may contain any special conditions or provisions, which, in the opinion of the authorities granting the same, are necessary for the protection of the said highways or bridges from injury. It seems to the writer that this requirement is necessarily restrictive, because it refers to any inch in width of any tire and that, without doubt there are a considerable number of trucks in the state which are provided with such size tires that the limit is being exceeded, notwithstanding such tires are those that years of experience and both technical and practical study, on the part of tire manufacturers and automobile engineers, show to be ample to meet all reasonable requirements.

The Automobile Law of Pennsylvania, approved July 7th, 1913, Act 385, Section 6, placed the limit, which, however, has just one saving feature, which appears in the word "nominal." No vehicle may be operated which exceeds 90 inches in width, exceeding 24,000 pounds gross weight of vehicle and load combined, exceeding 18,000 pounds maximum gross weight of vehicle and load combined upon any axle, or which exceeds "750 pounds maximum gross weight of vehicle and load combined upon any one wheel, for each nominal inch of width of solid tire upon the wheel."

The New Jersey Law, Chapter 113, P. L. Section 88, requires that a special permit shall be required for any vehicle, "the weight of which resting upon the surface of said highway or bridge exceeds 800 pounds upon any inch in width of tire, roller, wheel or other object supported upon the surface thereof," and it further requires that the owner, driver, operator or mover of any such vehicle shall be responsible for all damages which the highway or bridge may sustain, and the amount of such damage may be recovered by the authorities in charge of the maintenance or care of the highway or bridge. This law, as will be noted, stipulates that the maximum limit of weight applies to any inch in width of tire as supported on the surface of the roadway, and consequently is unduly restrictive.

It is to be hoped that those in the electric vehicle industry who may be affected by the unduly restrictive provisions of present laws in states that have enacted them, or of laws that may be proposed in future in states that may consider enacting them, will make every reasonable effort to see that these clauses are corrected where they now exist, and use their influence to prevent such laws being on the statute books in future.

—

Automobile Insurance Rate War Ends

NEW YORK CITY, May 11—The rate war in automobile liability insurance, caused by a cut of 25 per cent. by the Travelers' Insurance Co., has been practically settled through the mediation of the Insurance Department of the State. The bureau companies have agreed to restore rates on all risks effective after May 23. Non-bureau companies, it is expected, will probably join in with a like change in their rates.

The issuance of the "family driving clause" has been discontinued. The clause is an endorsement agreeing that the insuring company will defend damage suits for negligence brought against persons other than the insured who were driving the car at the time of the accident.

It was decided at a meeting held at the Casualty Insurance Exchange on May 12, to appoint a committee of four, consisting of the Royal Indemnity, Glove Indemnity, the Travelers and the Hartford & Accident Indemnity, to look into the situation and draft a new form of endorsement for use in giving family coverage. Only one company, it was shown, gave full coverage at the 25 per cent. cut.

Peace Treaty in Horn War—Klaxon and Long in Harmony

All Suits To Be Dismissed and Mutual Licensing To Result —Johns-Manville a Party

NEW YORK CITY, May 12—The Lovell-McConnell Mfg. Co., Newark, N. J., maker of the Klaxon horn, and the G. Piel Co., Brooklyn, N. Y., maker of the Long horn, have made peace. All the suits involving Lovell-McConnell, Piel and the H. W. Johns-Manville Co., which markets the Long horn, are to be discontinued and the Klaxon and the Long horns are to be made and marketed in competition with each other. Each company will make motor-driven and hand horns.

The agreement is between Lovell-McConnell and Piel, the Johns-Manville company entering into it only insofar as it is the selling end of the Long horn business, in which capacity it will continue. While the details of the agreement have not been perfected each company will take out licenses under the patents of the other and each will work on an equal basis so far as patent rights are concerned. Piel will produce a motor-driven horn similar to its hand-operated horn.

The wide breach between Klaxon and Piel followed the victory of Klaxon over the Newtone horn in the United States District Court in Brooklyn. Johns-Manville filed a suit in New York City, claiming Klazon was interfering with the Long horn advertising contracts. It also filed one charging Klaxon with imitating the Long hand horn. Suit also was instituted in the Federal court in Brooklyn against the Martin-Evans Supply Co., a Klaxon dealer, charging infringement of the Long hand horn flywheel patent No. 1,090,080.

The Klaxon patents are Nos. 923,048, 923,049 and 923,122 and under these suits were brought by Lovell-McConnell in Brooklyn against the Oriental Motor Supply Co., a Long horn dealer, and against the Johns-Manville company in the Federal court in New York. All of these will be discontinued.

There are now but two licensees under the Klaxon patents; aside from whatever licensing may be done in connection with the Klaxon-Long agreement the only holders of manufacturing rights are the Nonpareil Mfg. Co., maker of the Pilot hand horn, and the Culmer Engineering Co., maker of the Reliance hand horn, both located in New York City.

Vulcan and USL in Royalty Dispute

NEW YORK CITY, May 12—Being unable to arrive at an agreement as to what patent royalty payments should be made by the United States Light & Heating Co., New York City, to the Vulcan Motor Devices Co., the Vulcan company filed suit this week in the Supreme Court for New York county against the maker of the USL starting and lighting system. A difference in bookkeeping is said to be at the basis of the dispute.

The USL manufactures under the Munson patent covering the flywheel type of starter and has a contract with Vulcan for manufacturing under the patent. But when it came to interpret the contract the hitch developed. The Vulcan asks $20,244.05 divided as follows: $5,991.09, April 30, 1913; $10,811.84, July 31, 1913; $3,441.12, October 31, 1913.

Injunction Against Zenith on One Patent

CHICAGO, ILL., May 13—*Special Telegram*—Judge Sanborn, sitting in the United States District Court for the Northern District of Illinois today enjoined the Zenith Carburetor Co., of Detroit, from directly or indirectly infringing the Ahara patent No. 684,662, owned by the Stromberg Motor Devices Co., of Chicago. These two companies have been in patent litigation for some time. The Zenith company is enjoined unless it gives within 5 days a $20,000 bond to the Clerk of Court conditioned upon the payment of all profits made by the Zenith company and all damages which may be sustained by the Stromberg company by reason of the sale and use of carbureters in infringement of the Ahara patent. This is further conditioned upon the filing in the court of sworn statements of sales by the defendant to be submitted to the court at Madison, Wis., during the first week in each month covering the sales of the previous month of all carbureters made and sold by Zenith, together with factory numbers of the carbureters. The Stromberg company was denied an injunction as to the Richards patent No. 791,501 upon which it also made application for an injunction.

Kelly-Springfield Minority Interests Sue

NEW YORK CITY, May 11—Suit has been brought against the Kelly-Springfield Tire Co. by A. M. Polack, a New York broker, who, acting as the minority, recently opposed the refinancing plan of this company. He has applied to the Supreme Court for New York county for an injunction holding up the refinancing plan. The suit is aimed at the Kelly-Springfield Tire Co., Van H. Cartmell, Stephen Peabody, A. L. Scheuer, Jacob Oppenheimer, A. M. Poole, Gustavus Maas and F. A. Seaman.

The refinancing plan he opposes is as follows: to retire the debenture bonds at par and to issue first preferred stock in exchange for the present outstanding debenture bonds; to accept said debenture bonds in payment of subscriptions to the capital stock; to issue the second preferred capital stock in payment of the accumulated dividends on the present preferred stock at par and to issue second preferred stock convertible into common stock.

NEW YORK CITY, May 13—The Motor Truck Club of America will bring up at its next meeting on May 20, a very important subject, that is, the motor truck at the docks. At present, facilities at the city docks are not all that could be expected.

Chandler Six Weighs Only 3,030 Pounds

CHICAGO, ILL., May 12—In the item concerning the Chandler-Rayfield economy test in THE AUTOMOBILE of May 7 it was stated that the Chandler six used in the test weighed 3,530 pounds without passengers. This was an error and should have read 3,030 pounds. The typographical error in this instance is particularly regrettable as the Chandler Motor Car Co. prides itself upon low weight.

Predict Gasoline Famine Due to Overtaxed Refineries—Prices Low

KANSAS CITY, MO., May 11—A gasoline famine during the last months of the summer was forecasted at a special called meeting of the independent oil refiners of Kansas and Oklahoma in this city last week. Thirty per cent. of the gasoline stored for use during the hot months has been used during the last months and predictions were made that within 60 days the surplus would be used up.

In the Mid-continent field—the largest in the United States—a surplus of 8,400,000 gallons was stored during the winter by the independent refiners. The Standard Oil Co. made no provisions beyond their annual storage.

"The use of gasoline has increased 25 per cent. this spring," D. W. Moffitt of Coffeyville, Kan., president of the Western Petroleum Refiners' Association, said. "And now on the eve of the greatest crop year the Middle West has seen for many years and one of the most prosperous for the entire nation, motor car dealers everywhere report increased sales of cars. The shortage is more than a threat—it is imminent within 60 or 90 days."

One filling station in Kansas City is selling 8,000 gallons a day and several are disposing of 20,000 a week. In St. Louis reports to the refiners were of even larger sales. But despite the apparent diminishment of supply, the price is lower than it has been for many yars. Gasoline of the best grade is sold here at 12 1-2 cents a gallon and wholesale lots as low as 7 1-2 cents have been reported.

The famine will be due, not to lack of crude oil, but to lack of refineries. The oil fields of the two adjacent states have gone through a second boom. Prices for crude oil at the wells jumped during the last winter to the untouched prices of $1.05 a barrel and production increased by leaps and bounds. In the Cushing fields new wells are being brought in at a rate of 300 a month, despite the recent decline in price to 75 cents a barrel. A new pipe line from the Cushing fields to the Standard Oil refinery at Wood River, Ill., has been unable to take care of the increased flow and 50,000 barrels a month are being produced there that cannot be conveyed to refineries.

Speed Law of 1868 Still in Force in Philadelphia

Car Exceeding 7 Mile an Hour Limit Collides with Fallen Tree —Recovery for Death Denied

PHILADELPHIA, PA., May 8—If there is a law on the statute books prescribing a speed limit of 7 miles an hour within certain specified limits, even if said law is by common consent ignored on account of its ridiculously low limitation and no arrests made for fast driving unless 20 or 25 miles an hour is exceeded, persons who drive their motor cars faster than the 7-mile limit do so at their own risk and are even subject to prosecution for "speeding." So decreed Common Pleas Court No. 1 today, which set aside a verdict of $9,500 damages obtained by Wesley Rockett in his suit against the city.

Rockett's wife was killed on Neil Drive, Fairmount Park, August 9, 1911. The car in which they had been riding collided with a tree which had been blown across the highway the previous afternoon during a storm. Rockett in his suit to recover damages from the city contended that the city was responsible in failing to remove the tree, or to place sufficient danger lights thereon. He admitted that the automobile was going at a higher rate than is allowed under the park rules, but contended that the 7 miles an hour restriction was obsolete, as this limit was set in 1868.

His counsel insisted that the speed law in question was 46 years old and had become a dead letter with the advent of the automobile, that from the custom of motor cars going from 15 to 20 miles an hour in the park without molestation from the guards, the ancient act must be construed as of no effect and having no application to automobiles.

In Rockett's suit against the city the jury had agreed with these contentions and he had been awarded $9,500 damages. The city appealed, and in reversing the jury's findings the Court entered an order quoting the old act of 1868 and setting forth that the testimony that the car which Mrs. Rockett was in ran 18 or 20 miles an hour was sufficient to prevent a recovery from the city for the fatal accident.

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Must Sue Bankrupt for Indemnity

NEW YORK CITY, May 11—A new phase under the Workmen's Compensation Act has developed. In re Farrell, in the U. S. District Court, W. D., Washington, N. D., January, 1914 (211 Fed. 212), it was held that the liability of an employer of labor to contribute assessments under the Workmen's Compensation Act of Washington, is not a tax within the Bankruptcy Act.

According to this decision tax payments take precedence over claims of creditors of a bankrupt company.

Under the Industrial Insurance Act, each firm must contribute to the government a specified sum of money towards what is called an accident fund. This is for the purpose of relieving employers engaged in extra hazardous work from liability for negligence in the operation of their plants whereby injuries result to workmen, and to compensate such injured workmen. According to the above decision, the United States must take the same legal action as would be required by the creditors, to recover this money for the accident fund, because this is not made a lien upon the property.

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Georgia Tax Raise Invalid?

SAVANNAH, GA., May 12—Hundreds of automobile owners in Savannah and Chatham County will be interested in an announcement just made by Attorney General Warren Grice that the automobile tax act passed by the recent legislature, raising the tax on automobiles from $2 to $5, is void.

This is the unofficial opinion of the attorney general and is based on the claim that the act does not make itself clear in regard to county mileage, and that it is not the function of the court to interpret the meaning but to enforce the letter of the law.

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Big German Factories Amalgamate

BERLIN, GERMANY, May 1—Through the amalgamation of the Hansa Automobil Werke, of Varel and of Brelefeld and the Norddeutsche Automobil and Motoren Akt. Ges., of Bremen into a joint stock company which has been named the Hansa-Lloyd Werke, Akt. Ges., this new concern with its capital stock of $2,500,000 becomes Germany's second largest exclusive automobile manufacturing concern, as only the Benz company has a larger capitalization.

It is reported that there will be complete reorganization of the companies along American lines, that instead of manufacturing half a dozen or more models, only two or three different models will be made and in large numbers. The building of electric vehicles will be discontinued but the commercial and industrial vehicle department will be enlarged, in fact the capital stock of the concern is to be doubled before January, 1915.

Massachusetts Registrations Grow 17.6 Per Cent. This Year—More Cars in Other States

BOSTON, MASS., May 9—With only four months of 1914 gone the registrations of motor cars in Massachusetts is now larger than for the whole 12 months of 1912 and the figures show that there are but 11,000 less than the entire year of 1913. This is a good indication of the prosperity of the motor industry. There has been an increase of approximately 17.6 per cent. registrations for the first four months of this year over the corresponding period of a year ago. From January 1 to April 30 last year there were 43,544 motor cars listed, a gain of 7,682 over the same period in 1912. This year, with 51,226 cars registered so far, it shows an increase of 7,582 over 1913, so the relative gain for two years is about the same. There has also been a gain in the makers and dealers of 175 and 568 more motorcycles. The receipts have jumped also until now more money has been received than for the entire year of 1912. It looks as if the $1,000,000 mark will be reached this year. In 1913 the total receipts were $764,153.51. Here are the comparative figures for the first quarter of 1913 and 1914:

	1913	1914	Increase
Motor cars.	43,544	51,226	7,582
Motor cycles	3,524	4,092	568
Dealers ...	1,196	1,371	175
Operators ..	4,453	4,678	225
Renewals ..	14,945	17,483	2,538
Chauffeurs .	1,804	1,388	*416
Renewals ..	5,066	6,219	1,153
Receipts	$522,850.50	$621,053.99	$98,203.40

*Decrease.

Iowa "Motor Mad"—45,000 More Cars in 1914

DES MOINES, IA., May 11—Iowa is going automobile crazy. That is the word from the state automobile registry department, which estimates that Iowans will own and register 45,000 more automobiles this year than in 1913. In the first four months of this year there were more autos registered than in the entire year last year. The total registration for this year already is over 70,000 and the total for all of 1913 was less than that. The total for the first four months of 1913 was only 39,000. This is only a little more than half the number already "tagged" this year. Basing their estimates on the experience of previous years, state officials predict a total of 115,000 cars registered before the end of the year.

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HARRISBURG, PA., May 11—The total number of licenses issued for motor vehicles in Pennsylvania is 77,000. Of this number 72,000 are for pleasure cars and 5,000 for trucks of various kinds.

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MILWAUKEE, WIS., May 11—Wisconsin motor registrations by private owners for the year 1914 topped the record made through the full year of 1913 on May 5, on which day license No. 34,647 was issued. The 1913 total for Wisconsin was 34,646. This is the earliest date that registrations have exceeded the previous year's figures. On May 9 the total 1914 registration passed 35,250 and applications are coming in at the rate of 75 to 85 per day.

Peers Annul Pugh Patents on Detachable Wheel Hubs

Protection for Construction of Rudge-Whitworth Wheels in England Canceled by Highest Tribunal

LONDON, ENGLAND, May 7—Reversing the decision of both the lower and the appeals courts, the decision which upheld the validity of patents issued to John V. Pugh and covering both improvements in and relating to detachable wheel hubs of motor cars and the like, the House of Lords in Great Britain, on April 20, summarily dismissed the case which Pugh had brought against Riley, Ltd., Coventry, Eng., and the British Gregoire agency. Pugh's patent was issued in 1909 and amended in 1911, and practically forms the basis of the construction of the Rudge-Whitworth wheels.

In dismissing the case the lord chancellor stated it as his opinion that Pugh's patent was not a controlling one, inasmuch as it was virtually a combination of old inventions or of new inventions. These are not protected by any patent of which the subject was made clear in the litigation. The lord chancellor held that the Pugh wheel differed from the construction covered by Pugh's patent to a sufficient degree to make the claim of infringement exceedingly difficult. He stated, however, that the combination covered by Pugh's patent appeared to be both ingenious and advantageous and added that he was not prepared to say that if carefully claimed it might not have been patented as a special combination. The appeal in its relation to both validity and infringement was allowed. The case was dismissed with costs.

Saxon 30-Mile-a-Day Test Ends

DETROIT, MICH., May 11—With a total of 4,050 miles to its credit, the Saxon light car which the Saxon Motor Co., Detroit, Mich., started out a month ago to run 135 miles a day for 30 consecutive days, finished its work in a driving rain on May 8. No repairs or replacements were required during the run; the gasoline consumption was one gallon per 30 miles, and a gallon of lubricating oil lasted for 800 miles. The tires were in excellent condition.

On the day following the last run of 135 miles the completion of the trial was celebrated by a parade through the streets of Detroit. Headed by a brass band the machine that had done such good work and other cars, including 25 decorated Saxons with uniformed crews, went through the downtown streets and halted in a parking space near the City Hall, where the mayor presented a silver cup to M. A. Croker, who piloted the car throughout the 30 days trial.

Not only did crowds see the parade and the presentation of the cup, but the little car was watched with considerable interest as it made its daily mileage.

An inspection of the car at the end of the test showed that the mechanism was in excellent condition. The tires were not changed during the run and finished with but little signs of wear and tear. The cost of gasoline and oil figures out at about half a cent a mile.

The car made its trips over a course of about 12 miles, covering the same route each time. The course was covered 11 times each day, and the daily trips to and from the starting point proper brought up the mileage to just 135. The average time per lap was 45 minutes. The driver registered the time of each round in a checking book and his figures were checked each trip by observers.

Having brought the 30-day trial to a successful conclusion, the Saxon company is arranging for a non-stop economy trial to be held on May 16. Saxon dealers throughout the country are expected to enter. Each dealer will enter a car with a driver and an observer. The conditions call for a run of 200 miles without stopping the motor, and the car that finishes on the smallest amount of gasoline will be awarded a prize. The course is left to the discretion of the entrant.

Packard Carbureter Is Patented

WASHINGTON, D. C., May 8—To Russel Huff of the Packard Motor Car Co., Detroit, Mich., has just been issued patent No. 1,095,326. This covers the Packard carbureter as it is now used and the patent is assigned to the Packard company. Covering as it does many of the features which have proven a success with the Packard motor, this patent has considerable importance. Milton Tibbitts, patent counsel

Saxon cars parading to celebrate completion of 30-day run by 135-miles-a-day Saxon

Ten Patents Assigned to Universal Company

(*Continued from page* 1029)

sembled the plate can be secured by a nut which is screwed on the threaded valve stem. Two claims are incorporated in the patent, the first covering the valve stem hole in one end of the transversely split rim and the other the rim end bridging plate containing a corresponding valve stem hole.

Covers Studs and Tie Piece

Patent No. 1,095,779 covers the use of the transversely split demountable rim having studs projecting inwardly from its ends and a plate having openings to fit over these studs forming a tie piece. The construction of the rim according to this patent is illustrated on the left side of Fig. 3 in sectional and plan views. The split in the rim is shown at D and the ends of the rim are provided with inwardly extending studs L1, of which there are preferably two on each end of the rim. These studs are of sufficient length to penetrate into the felloe band and felloe as shown in the sectional view. This provides for a driving connection between the wheel and the rim. The plate L is curved to fit the contour of the rim and has the corresponding holes L2 which take the studs. When the plate is in place on the studs and against the inner periphery of the rim the split D is practically closed and the plate L bridges the split and being of sufficient thickness serves as a placing element between the rim's end and the felloe band, this properly supporting the ends of the rim.

Covers the Diagonal Split

Patent No. 1,095,996 has for its object the easy lateral separation of a split rim so that it can be more readily placed in or removed from a tire with a non-stretchable bead. The invention is illustrated in Fig. 5, and as will be seen is of basic importance in that it covers the transverse split in a demountable rim. In fact this patent, though issued last, involves a point upon which hinge many of the other Universal rim patents. Referring to the illustration it will be noted that the ends of the rim are separated by a diagonal cut across from one side to the other. According to the claims of the patent the split A must be diagonal. The patent was applied for by Charles Gilbert Hawley and Earl King Baker, on June 14, 1909. It incorporates two claims, the first of which mentions a straight transverse cut extending from a point on one edge of the rim to a circumferentially advanced point on the other edge of the rim. This wording meaning, a diagonal split. The second claim involves the combination of the diagonal split with locking means for securing the two ends of the rim in alignment.

for the Packard company, in mentioning the broad claims covered, states that the two spring auxiliary air valve with its adjusting wedge, the control of this valve by the driver and the closing of the main and auxiliary air intakes for obtaining a rich mixture for starting are among the features that are broadly claimed.

The application for this patent was filed in 1907 and it is claimed by the Packard company that this antedates the greater part of modern carbureter development. The patent is issued under date of May 5, 1914.

A. A. A. to Meet in the White Mountains

WASHINGTON, D. C., May 12—Bethlehem in the White Mountains has been decided upon as the place for the semi-annual meeting of the American Automobile Assn., to take place July 3 to 5. Chairman Lewis R. Speare, of the special committee in charge of the arrangements, has designated the Maplewood hotel as the official stopping place, and this New Hampshire establishment is capable of comfortably taking care of a large number of road travelers. Mr. Speare has added to his committee several members, and it now includes Frank X. Mudd, of Chicago; Dr. H. M. Rowe, of Baltimore; Laurens Enos, of Buffalo; Robert P. Hooper, of Philadelphia; Alfred Reeves, of New York; and James Fortescue, of Boston, who is also the secretary of the Massachusetts State Association.

Preceding the White Mountains meeting will be the A. A. A. National Reliability Tour, in the form of a day and night run from Chicago to Boston, managed by the Chicago Automobile Club, and under the supervision of the A. A. A. Touring and Contest boards. The finish of this notable event for the Glidden, A. A. A. Touring, and Anderson Cup trophies at Boston will mean that the largest city of New England will be the magnet drawing those who will on the morning of July 3 start for the White Mountains country. Chairman Speare has designated the Somerset hotel in Boston as headquarters in that city.

Schebler Shipments 26,000 in March

NEW YORK CITY, May 12—In THE AUTOMOBILE for May 7 it was stated that Wheeler & Schebler are making 1,000 carbureters a day and also that the March shipments which were the biggest in the history of the concern was 2,600 carbureters. This latter statement was obviously a typographical error, the correct figures being 26,000.

New Company in General Lubricant Field

WORCESTER, MASS., May 11—There has just been formed here the Continental Asbestos Co., a corporation with a capital stock of $200,000, but with the privilege of making it $1,100,000 later. The company has begun operations in a factory at 7-11 Summer street and turns out five different kinds of lubricant for use on all kinds of machine. The different kinds are as follows: Spedolene for automobiles and motor trucks; Journalene for all kinds of journals; Asbestolene for gears and parts of every description; Cupolene, for machines having a cup feed, and Axolene for machines using axles, including all kinds of vehicles. The company is turning out a large quantity a day, and the product before manufacture comes from Quebec. The Worcester company controls the United States and Cuba with rights in South Africa, France, England and other European countries.

DETROIT, MICH., May 8—Wm. B. Stout, cyclecar expert of the staff of *Motor Age*, has been appointed chief engineer of the Scripps-Booth Cyclecar Co., this city. Mr. Stout has been a leading exponent of the cyclecar movement since its inception. He takes up his new duties May 15.

Car Exports Continue To Increase; Truck Trade Is Off

From $2,909,741 in March, 1913, Pleasure Vehicle Business Grows to $3,048,847 —Imports Decline

WASHINGTON, D. C., May 9—Figures showing the exports of motor cars during March and the 9 months ending March, together with comparative figures, were issued today by the bureau of statistics. They show that during March, 50 commercial cars, valued at $63,932, and 3,538 pleasure cars, valued at $2,984,915, were exported. During the same month of last year 108 commercial cars, valued at $191,223, and 2,734 pleasure cars, valued at $2,718,518, were shipped abroad. During the 9 months' period the exports of commercial cars decreased from 653 valued at $1,198,590 in 1913, to 543 cars valued at $861,654 in 1914. The exports of pleasure cars, however, showed a marked increase from 16,677, valued at $16,563,779, in 1913, to 19,928 cars, valued at $17,904,002, in 1914.

The exports of parts, not including engines and tires, increased in value from $604,469, in March, 1913, to $701,038 in March last, and from $3,587,805 to $4,923,339 during the 9 months' periods.

Imports of cars show a marked decline. The number imported during March, 1913, was forty-nine, valued at $104,714, while in March last the number was fifteen and the value $15,867. During the 9 months' period the number decreased from 618 valued at $1,434,059 in 1913, to 245 valued at $545,226 in 1914. On the other hand the imports of parts, except tires, showed a large increase. The imports for March, 1913, were valued at $15,236, increasing to $90,928, in March last, while during the 9 months' period the imports rose in value from $199,888 in 1913, to $488,730 in 1914.

The exports of cars, by countries, during the periods under consideration, are shown in the accompanying table:

Saxons Sold on 5-Month Payment Plan

NEW YORK CITY, May 11—L. A. Van Patten, distributor in this city for the Saxon car, has developed a 5-month payment plan, by which the customer obtains the car for a cash payment of $195 and five notes, dated a month apart. The first four notes are for $50 each, and the final note is for $23.30, which is the cost of the freight, a gallon of oil, and 6 gallons of gasoline.

The first four notes bear interest at the rate of 6 per cent. per annum, making a total interest of $2.50 that the customer pays for the accommodation of not having to pay all cash.

To Make Seaton Wheel in Nashville

NASHVILLE, TENN., May 12—The Federal Mfg. Co., which just has been incorporated in Nashville, Tenn., with $100,000 capital, has acquired from the Seaton Wheel Co. the patent rights under which the Seaton spring wheel is made.

Metropolitan S. A. E. to Hold Festival

NEW YORK CITY, May 13—The Metropolitan Section of the Society of Automobile Engineers will hold a fair weather festival at 247 West Fifty-fourth street, Friday evening, May 15, at 8 o'clock. This is the semi-annual get-together meeting of the section and only members in good standing are invited to attend. Moving pictures and other entertainments will be provided as well as ample refreshments.

TABLE OF AUTOMOBILE EXPORTS FOR MARCH AND 9 PRECEDING MONTHS

	March				Nine Months Ending March			
	1913		1914		1913		1914	
	NO.	VALUE	NO.	VALUE	NO.	VALUE	NO.	VALUE
France	83	$ 70,190	164	$ 98,427	501	$ 399,600	700	$ 509,241
Germany	95	108,713	361	264,203	392	382,353	951	677,347
Italy	36	30,853	23	13,664	228	200,498	234	163,808
United Kingdom	633	462,696	819	637,884	2,747	2,090,585	5,600	4,460,803
Other Europe	219	193,091	590	498,142	1,045	907,601	1,741	1,404,969
Canada	849	1,082,076	500	531,029	4,919	6,055,020	2,687	3,552,406
Mexico	18	49,762	21	24,139	249	475,921	154	241,667
West Indies and Bermuda	43	45,334	36	34,682	340	353,558	408	383,281
South America	251	294,779	129	114,276	2,195	2,441,909	1,592	1,614,860
British Oceania	304	292,119	561	491,850	2,341	2,177,218	3,077	2,658,621
Asia and other Oceania	210	190,277	196	185,647	1,542	1,479,519	1,664	1,617,970
Other countries	101	89,851	188	154,904	831	798,577	1,663	1,480,683
Total	2,842	$2,909,741	3,588	$3,048,847	17,330	$17,762,369	20,471	$18,765,656

Charter for New Knox Company Given Mayo Heirs

Harry G. Fisk and Edward O. Sutton Head Company Capitalized at $2,500,000—Invite Old Stockholders in

BOSTON, MASS., May 9—The Knox Motors Co., Springfield, Mass., is the name of the new company formed by the men who bid in the property at the sale held in that city last week. This morning they went to the state house and filed with the commissioner of corporations an application for a certificate of incorporation. There was no delay and Secretary of State F. J. Donahue shortly afterward issued the charter to the new company.

H. G. Fisk, treasurer of the Fisk Rubber Co., is president; E. O. Sutton, who bid in the plant, is treasurer, and attorney C. H. Beckwith is clerk. All three serve also as directors.

It is capitalized at $2,500,000 with 12,500 shares of preferred and 12,500 common stock at a par value of $100 each. The preferred stock carries a dividend of 6 per cent. and no dividends will be payable on the common stock unless the net surplus equals 10 per cent. of the par value of the preferred stock with interest before the dividend is declared. Each incorporator has subscribed for $1,000 worth of preferred shares.

The stock is apportioned as follows: Preferred stock—real estate, 3,250 shares; machinery, 3,750 shares; merchandise, 5,500 shares. Common stock—trademarks, 2,000 shares; good will, 500 shares; organizing and financing company, 10,000 shares. In organizing the new company $250,000 worth of preferred stock has been reserved and is offered to stockholders of the Knox Automobile Co., and to furnish an opportunity to make good the loss in value of the old stock a bonus of 100 per cent. of common stock of the Knox Motors Co. is offered with it to these stockholders. This exclusive offer expires May 20.

The company intends to continue the building of passenger cars, fire apparatus and tractors. All the models now on hand will be sold out so that the company will start with a clean slate.

Mr. Fisk and Mr. Sutton are both sons-in-law of the late A. N. Mayo, to whom the Knox company owed almost $1,000,000 and to whose death was due the present financial troubles of the old company because the estate had to be settled up.

Market Reports for the Week

The usual changes occurred in this week's market reports. Tin rose gradually and closed at a gain of $0.70 per 100 pounds. There was a small demand from domestic consumers at this advance. Lead remained dull but steady at $3.90 per 100 pounds. The market for electrolytic copper is firmer as most of that copper offered by second hands has been taken up. Antimony was dull at $0.05 3-4. A decline of $0.10 was experienced in the Pennsylvania petroleum market. Trading in the rubber market was quiet, manufacturers of rubber goods being disposed to follow a conservative course in the matter of securing supplies of raw material. Speculative trading is also apparently on a small scale. Up-River Para was available for prompt delivery at $0.73, but there was little doing at that figure.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	.....
Beams & Channels, 100 lbs.	1.26	1.26	1.26	1.26	1.26	1.26	.....
Bessemer steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	.....
Copper, Elec. lb.	.14⅛	.14⅛	.14	.14	.14⅛	.14⅛	.....
Copper Lake, lb.	.14¼	.14¼	.14⅛	.14⅛	.14¼	.14⅛	—.00⅛
Cotton Seed Oil, bbl.	7.25	7.23	7.13	7.13	7.10	7.05	—.20
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	.....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.16	.16	.16	.16	.16	.16	.....
Lard Oil, prime	.93	.93	.93	.93	.93	.93	.....
Lead, 100 lbs.	3.90	3.90	3.90	3.90	3.90	3.90	.....
Linseed Oil	.54	.54	.54	.54	.54	.54	.....
Open-Hearth Steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	.....
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	.....
Petroleum, bbl., Pa. crude	2.00	2.00	2.00	2.00	2.00	1.90	—.10
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	.....
Rubber, Fine, Up-River, Para	.74½	.74½	.74½	.73	.73	.73	—.01½
Silk, raw Ital.	..	..	5.10	..	5.10	5.10	.....
Silk, raw Japan	..	..	4.55	..	4.55	4.50	—.05
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	33.05	33.50	34.38	33.38	33.75	33.75	+.70
Tire Scrap	.04½	.04¾	.04¾	.04¾	.04¾	.04¾	+.00¼

Stanweld Gains 25 Per Cent. in March

CLEVELAND, O., May 8—The month of March, 1914, was by far the most successful the Standard Welding Co. has ever experienced, the business being 25 per cent. greater than that of the corresponding month of the previous year, and 5 per cent. greater than that of any previous month since the inception of the organization.

The shipments, computed on a basis of 25 days to the month, amounted to nearly 100 tons a day and nearly every department in the immense plant is operating 24 hours a day to fill the orders.

In the steel tubing department, which supplies a large part of the bicycle, motorcycle, automobile and kindred industries, the present output is over 2,000,000 feet per month, with new orders and added facilities rapidly increasing each preceding month's total.

A 1915 Velie To Sell for $1,500

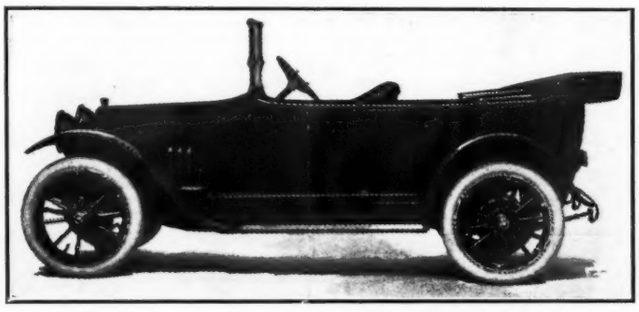
MOLINE, ILL., May 8—The Velie Motor Vehicle Co. has made public the specifications of its first 1915 car, which is to be known as Model 11 and which will sell for $1,500, including full equipment. The car is new all the way through and has a streamline touring body which will seat five passengers. The motor has four cylinders, the bore and stroke being 4 and 5 1-2 inches, respectively, and is rated at 35 horsepower. The other principal specifications are Bosch dual ignition, Stromberg double-jet carbureter, dry plate clutch, Gray & Davis lighting and starting, 106-inch wheelbase, 34 by 4 inch tires, semi-elliptic front and three-quarter elliptic rear springs.

New Imp Cyclecar To Be Larger

AUBURN, IND., May 14—The Imp Cyclecar, which is produced by the Imp Cyclecar Co., Auburn, Ind., is about to take unto itself a larger brother. President W. H. McIntyre has announced that the new Imp will have a four-cylinder water jacketed motor, rated at 10 horsepower, and will be ready for June deliveries. The new car, like its predecessor, has a 36-inch tread; the wheelbase of the new model will be 100 inches and it will be equipped with 28 by 2 1-2-inch tires, engine starter, a gearless differential, double universal joints and a shaft drive to friction transmission under the rear seat with single chain drive to the rear axle; double front springs will be used, the rear springs being cantilever members; two passengers will be carried—one before the other; the vehicle will weigh 750 pounds and will sell, completely equipped, for $395.

Bid $800,000 for Walpole Property

BOSTON, MASS., May 12—$800,000 was the only bid yesterday for the property of the bankrupt Walpole Tire & Rubber Co. As the upset price fixed by the Federal Court was $1,150,000, the property was not sold. Curtis G. Metzler, representing the reorganization committee of the stockholders, was the bidder. The court will be asked to authorize the sale to the committee at the price offered. Mr. Metzler's plan of reorganization was given in THE AUTOMOBILE for April 9.



1915 four-cylinder Velie with streamline body

New Columbus Buggy Co. Sold to Thomas Buyer—A Merger?

No Denial—Thomas Car May Be Built in Columbus Plant— To Boost Production for 1915

COLUMBUS, O., May 11—The New Columbus Buggy Co., which in January last was incorporated with $500,000 capital and took over the Columbus Buggy Co., Columbus, O., was sold in entirety last Saturday to C. A. Finnegan and E. D. Hofeller, both of Buffalo, N. Y. Finnegan is the man who about a year ago took over the defunct E. R. Thomas Motor Car Co., and this fact has led to something more than a rumor that the Thomas company will be removed to Columbus and consolidated with the buggy company. Finnegan, in fact, is authority for the statement that "It is very likely that we will move the E. R. Thomas company and operate it at the Columbus plant."

Although the price paid for the Columbus company has not been divulged it is understood that it was a comparatively large one. By the contract of sale the new owners will take over all of the capital stock of the buggy company. They plan not only to continue the plant in operation but largely to increase its output.

At the time the New Columbus Buggy Co. was organized, G. W. Lattimer, a wholesale druggist and one of the two men who had been directing the operation of the factory, was elected president. The other officers elected were E. R. Sharp, vice-president; D. N. Postlewaite, secretary; G. W. Bright, treasurer. These officers and O. A. Miller, F. O. Schoedinger, Robert Jeffery and T. J. Cavanaugh comprised the board of directors.

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Herreshoff Assets Bring $89,000

DETROIT, MICH., May 11—In consideration of a total of $89,000, the Detroit Trust Co., receiver in bankruptcy for the defunct Herreshoff Motor Co., on last Friday disposed of the remaining property, buildings and other assets. The Jacob-Nicol Realty Co. obtained the buildings and real estate for $75,000. The property consists of a plot extending 264 feet on Woodward avenue, the entire length of the block between Trowbridge and Belmont avenues, on which there stands a two-story brick modern factory building.

The remaining assets of the Herreshoff company were taken over by the Harris Bros., a Chicago house wrecking firm, the amount paid being $14,000.

It is expected that the referee will announce a 5 per cent. dividend within the next two weeks and that final settlement will be made as soon as all the disputed claims are adjudicated.

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KENOSHA, WIS., May 9—The Littand Mfg. Co., Kenosha, Wis., which established a foundry for the production of Littand bronze material for bushings, etc., has filed a voluntary petition in bankruptcy. The assets are given as $10,320 and liabilities $29,315.

Automobile Securities Quotations

NEW YORK CITY, May 13—The stock market has been unusually dull during the past week, very little trading being done and many of the stocks showing weakness, the oil securities being especially so, largely due to the Mexican situation. Some of the changes are as follows: Reo car stock was strong, showing an increase of 7 1-4 points for the week. This is said to be due to rumors of a dividend and an increase of capital stock of the company. Studebaker preferred also showed a slight gain, being 2 3-4 points higher than last week. Willys-Overland common was strong, registering a gain of 5 1-2 points. Vacuum Oil did little better than last week though it is still weak. Figures for the week are as given in the following tabulation which includes the figures for 1913:

Security	Wednesday Bid	Wednesday Asked	Thursday Bid	Thursday Asked	Friday Bid	Friday Asked	Saturday Bid	Saturday Asked	Monday Bid	Monday Asked	Tuesday Bid	Tuesday Asked	Week's Change	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co. com	200	..	200	..	200	..	200	..	200	..	200	..	..	155	..
Ajax-Grieb Rubber Co. pfd	98	102	98	102	98	102	88	102	98	102	98	102	..	95	100
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	98	101
Case T. M. Co., J. I	80	82½	80	82½	80	82½	80	82½	80	82½	80	82½	..	..	..
Chalmers Motor Co. com	..	82½	..	82½	..	82½	..	82½	..	82½	..	82½	..	..	..
Chalmers Motor Co. pfd	92	94	92	94	92	94	92	94	92	94	92	94	..	..	..
Electric Storage Battery Co	51½	52½	51¾	52½	51¼	51¾	52	52¼	51½	52	51½	52	— ½	..	..
Firestone Tire & Rubber Co. com	283	288	283	288	283	288	283	288	283	288	283	288	..	265	290
Firestone Tire & Rubber Co. pfd	108	109½	108	109½	108	109½	108	109½	108	109½	108	109½	..	105	106½
Garford Co. pfd	75	85	75	85	75	85	75	85	75	85	75	85	..	99	100½
General Motors Co. com	78	79¾	79	80½	78	80	78	79½	78	80¼	78	80¼	—1	23	26
General Motors Co. pfd	90¾	92	90	92	90	92	90¾	92	90	90⅞	90	90⅞	..	70	75
B. F. Goodrich Co. com	26¼	26½	26	26¾	25¾	25⅞	25½	26	25½	26½	25½	26½	— ⅜	32	34
B. F. Goodrich Co. pfd	89⅝	90½	90	90½	89¾	90½	90	90¾	89⅞	90	89⅞	90	+ ⅞	91	93
Goodyear Tire & Rubber Co. com	168	172	168	172	168	172	168	172	168	172	168	172	..	325	331
Goodyear Tire & Rubber Co. pfd	94	95½	94	95½	94	95½	94	95½	94	95½	94	95½	..	99½	100⅝
Gray & Davis Co. pfd	90	97	90	97	90	97	90	97	90	97	90	97	..	..	..
International Motor Co. com	..	5	..	5	..	5	..	5	..	5	..	5	..	5	5½
International Motor Co. pfd	..	15	..	15	..	15	..	15	..	15	..	15	..	12	16
Kelly-Springfield Tire Co. com	52	54	52	54	52	54	52	54	52	54	48	50	—4	..	..
Kelly-Springfield Tire Co. pfd	135	140	135	140	135	140	135	140	135	140	130	140	—5	..	..
Lozier Motor Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	..	20
Lozier Motor Co. pfd	..	35	..	35	..	35	..	35	..	35	..	35	..	..	..
Maxwell Motor Co. com	9¼	9¾	9¼	9¾	9¼	9¾	9¼	9¾	9¼	9¾	9¼	9½	+ ⅜	3	5¼
Maxwell Motor Co. 1st pfd	41	41¼	41	41¼	41	41¼	41	41¼	41	41¼	41	42	+1	40	50
Maxwell Motor Co. 2d pfd	15	15½	15	15½	15	15½	15	15½	15	15½	15½	15¾	+1	12	16
Miller Rubber Co	131	140	131	140	131	140	131	140	131	140	131	140	..	140	150
New Departure Mfg. Co. com	122	124	122	124	122	124	122	124	122	124	122	124	..	..	..
New Departure Mfg. Co. pfd	105½	107	105½	107	105½	107	105½	107	105½	107	105½	107	..	..	..
Packard Motor Co. com	103	..	103	..	103	..	103	..	103	..	103	..	..	98	102
Packard Motor Co. pfd	94	98	94	98	94	98	94	98	94	98	94	98	..	..	..
Peerless Motor Co. com	18	25	18	25	18	25	18	25	18	25	18	25	..	35	45
Peerless Motor Co. pfd	..	70	..	70	..	70	..	70	..	70	..	70	..	95	100
Pope Mfg. Co. com	1	3	1	3	1	3	1	3	1	3	1	3	..	16	19
Pope Mfg. Co. pfd	7	12	7	12	7	12	7	12	7	12	7	12	..	50	53
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	35	41
Portage Rubber Co. pfd	..	85	..	85	..	85	..	85	..	85	..	85	..	85	90
*Reo Motor Truck Co	8¾	9¼	8¾	9¼	8¾	9¼	8¾	9¼	8¾	9¼	8¾	9¼	..	11⅝	12⅛
*Reo Motor Car Co	20¾	21½	20¾	21½	20¾	21½	20¾	21½	20¾	21½	28	..	+7¼	20	22
Rubber Goods Mfg. Co. pfd	100	110	100	110	100	110	100	110	100	110	100	110	..	100	105
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	50	53	50	53	50	53	50	53	50	53	50	53	..	..	..
Stewart Warner Speedometer Corp. pfd	97	100	97	100	97	100	97	100	97	100	97	100	..	..	..
Studebaker Co. com	34¼	34½	33	33⅝	32½	33	32¼	33	32½	33½	32½	33½	—1	27½	28
Studebaker Co. pfd	87	88	87	88	87	89	87	89	87¾	89	87¾	89	+2¾	89	93
Swinehart Tire & Rubber Co	62	66	62	66	62	66	62	66	62	66	62	66	..	85	90
Texas Company	142	145	142	143½	139	141	140	142	140⅛	142	140⅛	142	—3⅜	..	..
U. S. Rubber Co. com	58⅛	58½	58⅛	58¼	57	57¾	57⅛	57½	57½	58	57½	58	— ¾	63¾	64¼
U. S. Rubber Co. 1st pfd	102½	102⅞	101½	103	101	102	101	102⅝	102	102⅞	102	102⅞	+ ¼	104¾	105¼
Vacuum Oil Co	223	226	223	225	222	228	217	222	217	222	218	220	+3	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	107	109
Willys-Overland Co. com	64	66	64	66	64	65½	64	65½	64	65½	63½	65	+5½	58	61
Willys-Overland Co. pfd	88	92	88	92	90	95	90	95	90	95	87	91	..	85	92

*The par value of these stocks is $10; all others $100.

Accessory Prizes in 500-Mile Race, $9,725 —Drivers Working Out on Speedway

NEW YORK CITY, May 14—The Bosch Magneto Co. has decided not only to give its usual prizes for the cars using its ignition that run first, second or third in the Indianapolis 500-mile race, but an additional offer is made of a $500 prize to the driver who breaks the record average of 78.72 miles an hour for the distance, provided that Bosch magneto and plugs are used.

This additional $500 brings the total accessory prize offer up to $9,725. The following accessory firms are offering cash prizes:

	1	2	3	4
Emil Grossman Co.	$ 500	$250	$100	..
Bosch Magneto Co.	600	400	300	..
Wheeler & Schebler	1,000	300	200	$100
Longuemare Carburetor Co.	1,000	400	200	..
Findeisen & Kropf	1,000	300	300	..
J-B. Carburctor Corp.	1,000	300	200	..
Standard Roller Bearing Co.	500	250	125	..
Total	$5,600	$2,200	$1,325	$100
New Bosch offer	500	..	..	..
	$6,100	$2,200	$1,325	$100

The Waltham Watch Co. has come forth with a special efficiency prize, consisting of a solid gold watch and to be given not necessarily to the winner of the race, but to the driver of the car who finishes among the first three and at the same time displays the greatest efficiency. Up to date the following trophies, etc., have been offered:

Prest-O-Lite Co., Boston, Mass. ..... Trophy.
Remy Electric Co., Anderson, Ind. ..... Grand Brassard and Trophy.
Wheeler & Schebler, Indianapolis, Ind. ..... Cup.
Findeisen & Kropf, Chicago, Ill. ..... Silver Punch Bowl.
Waltham Watch Co., Waltham, Mass. ..... Gold Watch.
G. & J. ..... Shield.

The $20,000 offered by the Indianapolis Motor Speedway Co. added to the accessory companies offers to the winner amounts to $26,100. Second place will receive $12,200, third place, $6,325, and fourth place, $3,600, with the combined Speedway and accessory prize offers for those respective positions. The Speedway company is offering $3,000 to fifth place, $2,200 to sixth place, $1,800 to seventh place, $1,600 to eighth place, $1,500 to ninth place and $1,400 to tenth place, totaling the combined offers of the Speedway company and accessory firms up to $59,725.

Order of Speedway Time Records

The following table shows the graduation of times made by those cars that finished within the money in the three 500-mile races that have been run. The cars shown are only those finishing 500 miles under 7 hours' time:

National	6:21:06	First in 1912.
Fiat	6:31:29	Second in 1912.
Mercer	6:34:56	Third in 1912.
Peugeot	6:35:05	First in 1913.
Stutz	6:36:36	Fourth in 1912.
Marmon	6:42:08	First in 1911.
Lozier	6:43:51	Second in 1911.
Schacht	6:46:28	Fifth in 1912.
Mercer	6:48:13.4	Second in 1913.
Stutz	6:48:49.25	Third in 1913.
Stutz	6:50:28	Sixth in 1912.
Fiat	6:52:29	Third in 1911.
Mercedes	6:52:57	Fourth in 1911.
White	6:52:58	Seventh in 1912.
Marmon	6:54:53	Fifth in 1911.
Lozier	6:59:37	Eighth in 1912.

Gilhooley in Isotta Last Entry

NEW YORK CITY, May 14—The latest driver to be announced is Ray Gilhooley, who has been nominated to drive the Isotta entry, number 49, in the race. This car is entered by G. M. Hecksher, a New York yachtsman.

Mrs. Nancy Pearl Titze has formally withdrawn her entry of a Titze car, as women have no standing with the contest board of the A. A. A. However, the car still remains in the race, as her husband, Adolph Titze, has been substituted as the car's backer.

A number of the cars have arrived at Indianapolis, where they are being tuned up by their respective drivers. Jules Goux and Georges Boillot arrived in Indianapolis on May 10, about a day ahead of schedule. Another arrival is Bob Burman. A number of the cars went out on the track last Sunday and thrilled the crowd by their bursts of speed. Arthur Klein in his King, Clark with his Texas, Wilcox in his Gray Fox, the Stutz crew, headed by Barney Oldfield, and a Maxwell piloted by Carlson, were out tuning up their mounts.

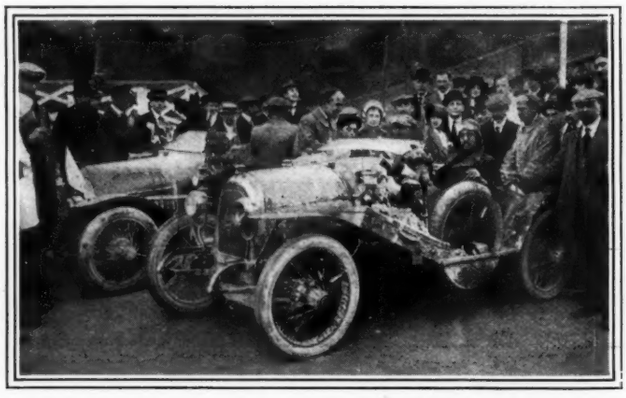
Spencer Wishart's Mercer has been shipped to Indianapolis. He will follow with his mechanic in a day or so. The other Mercer drivers, Caleb Bragg and Eddie Pullen, are to go in a very few days with their cars. Complete entries are:

No	Car	Cyl.	B. & S.	P. Disp.	Driver
1	Burman	4	5.1x5.5	449.4	Burman
2	Stutz	4	..	..	Cooper
3	Stutz	4	..	..	Oldfield
4	Gray Fox	4	5 x5.5	431.9	Wilcox
5	Beaver Bullet	4	5.1x5.5	449.4	Keene
6	Peugeot	4	3.9x7	341.7	Goux
7	Peugeot	4	3.9x7	341.7	Boillot
8	Maxwell	4	4.2x8	445	Tetzlaff
9	Sunbeam	6	3 x5.9	245	Chassagne
10	Delage	4	4.1x7	380.2	Guyot
12	Excelsior	6	3.8x6.2	446.6	Christiaens
14	Peugeot	4	3 x6.1	183	Duray
15	King	4	5.1x5.5	449.4	Klein
16	Delage	4	4.1x7	380.2	Thomas
17	Burman	4	5.1x5.5	449.4	Disbrow
18	Mercedes	6	4.1x5.5	445	DePalma
19	Mercer	4	4.8x6.2	445	Wishart
21	Mercer	4	4.8x6.2	445	Bragg
22	Mercer	4	4.3x5	300	Pullen
23	Mercedes	4	4.4x7.2	448	Mulford
24	Stutz	4	..	..	Anderson
25	Maxwell	4	4.2x8	445	Carlson
26	Marmon	4	4.5x7	445	Dawson
27	Sunbeam	6	3.1x5.9	273	Grant
28	Stafford	4	4.2x5.1	290.7	Callahan
29	Metropol	4	4.2x7.1	446	Horan
31	Keeton	4	5.1x5.5	449.4	Knipper
32	Maxwell	4	4.2x8	445	..
33	Texas	4	5.1x5.5	449.4	Clark
34	Bugatti	4	3.9x7.1	350	Friedrich
35	Great Western	4	4.2x8	445	Jenkins
36	Great Western	4	3.7x5.7	254	Price
37	Great Western	4	4.2x8	445	..
38	Braender Bull Dog	4	4.4x6	350	Chandler
39	Pope Bullet	4	4.7x5.7	407	Roberts
41	Washington	4	4.7x5.7	407.6	Stringer
42	Dusenberg	4	4.4x6	360.5	Rickenbacher
43	Dusenberg	4	4.4x6	360.5	..
44	Mason	4	4.4x6	360.5	Mason
45	Tatter	4	4.1x5.3	286	Mazzucco
46	Rayfield	6	4.1x5.5	442.6	Hughes
47	Titze	4	5.1x5.5	449.4	..
48	Ray	4	5.1x5.5	449.4	Brock
49	Isotta	4	4.7x6.3	443.8	Gilhooley
50	Unknown	..	Not given		Not given

A 2-Mile Brick Speedway for Philadelphia

PHILADELPHIA, PA., May 9—Announcement was made today of the preliminary plans for the construction of the Philadelphia Speedway and the project now begins to assume definite shape.

Briefly, the plans comprehend the construction of a two-



Majola car which took third place as regards fuel economy in the 2,000-mile light car test run around France

mile brick automobile race track inside of which will be a one-mile dirt horse track, both running parallel to the Old York road. Inside will be parking space for motor cars, estimated to accommodate 25,000.

Steel and concrete stands will line the course, access thereto being by incline walks, thereby abolishing stairways. Entrance to the stands will be by overhead bridges, eliminating danger of grade crossing over car tracks and auto driveways. On the northern end of the acquired property a club house will be erected.

Sixteen concrete tunnels under the track will afford access to the infield for automobiles.

Vanderbilt and Grand Prix Exposition

NEW YORK CITY, May 12—The Vanderbilt and the Grand Prix races have been awarded to the Panama-Pacific Exposition, to be held early in the spring of 1915. A committee of the directors of the Panama-Pacific Exposition has been in this city for some time endeavoring to secure this award. The directors who have been in this city in the interests of the races are W. L. Hughson, of the firm of Hughson & Merton, well known in the automobile world on the Pacific coast and chairman of the racing committee of the Panama exposition; H. P. Scott, of the Union Iron Works; M. H. Young, San Francisco *Chronicle;* R. A. Crothers, of the *Bulletin,* and H. E. Cooley, chief of special events.

A map of the course for the races was shown in THE AUTOMOBILE of April 30. The Vanderbilt race will be sanctioned by the A. C. A. and the Grand Prix by the A. A. A. The Motor Cups Holding Co., of which W. K. Vanderbilt, Jr., is president, will sanction the trophies for both events. These races will take place 2 weeks apart, the Vanderbilt coming first.

Wins Atlanta Hill Climb Third Time

ATLANTA, GA., May 9—For the third successive time L. C. Crane, driving a Pope-Hartford car, won the annual Stewart Hill contest at Atlanta, Ga., on Saturday, thereby winning permanent possession of the cup offered by the Atlanta Automobile and Accessories Assn., which organized the hill-climb. The time was 50 2-5 seconds.

Crane's time for the hill was beaten by Dr. Frank Edmonsson's Marmon, driven by Tom Edgars, in the free-for-all. The time, 47 1-2 seconds, set a new record for the hill.

The summary:

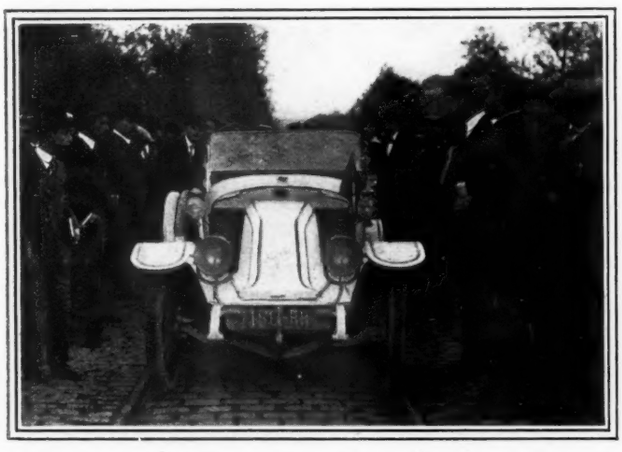
Class C—160-230 cubic inches. Won by Odom, Studebaker, time 1:04 1/5; second, Rooney, Studebaker, time 1:12.

Class C—231-300 cubic inches. Won by Cohen, Studebaker, time 0:58; second, Studebaker, McCune, time 1:00; third, Ford, Alexander, 1:11 3/5.

Class C—301-450 cubic inches. Won by McKinstry, Stearns, time 1:05; second, Boyers, Overland, time 1:12 4/5; third, Pope-Hartford, time 1:16 2/5.

Class C—451-600 cubic inches. Won by Crane, Pope-Hartford, time 0:51 2/5; second, McKerrall, time 0:52.

Class D—Free-for-all. Won by Edgars, Marmon, time 0:47 2/5; second, Crane, Pope-Hartford, time 0:50 2/5; third, McKerrall, National, time 0:51.



Four-cylinder, two-seated Hurtu which made an average of 42.4 miles per gallon of fuel in the 2,000-mile endurance test of light cars around France. This is the first time that a fuel economy test has been conducted over such a long distance

42.4 Miles Per Gallon on French Car Trials

Eighteen Light Cars Show Economy in 2,000-Mile Test Running 19 Miles Per Hour

PARIS, FRANCE, May 2—Out of twenty-two starters, eighteen light cars have finished the 2,000-mile endurance test around France in ten daily stages. The competition was of a distinctive nature. An average speed of 19 miles an hour had to be maintained for the entire distance, the fuel consumption was controlled, and a close account kept of the number of tires used. It is the first time that a fuel consumption test has been held over such a long distance. No important mountain work was done.

Leaving Paris, the competitors passed through Tours, Limoges, Toulouse, Nimes, Monte Carlo, Avignon, Geneva, Besancon, Nancy, and back to Paris. This route avoided the Pyrenees and the Alps. During the 10 days they were on the road there was practically no rain, this of course helping in the matter of fuel consumption. On the first day a Humberette dropped out owing to the car overturning in a ditch. Three others abandoned the run later, but the rest went through without any incident.

Only One Case of Tire Buying

At the start each car was given one spare tire and one spare tube, these, together with the tires on the wheels, being stamped. With only one exception the cars covered the full distance on these tires. Rather curiously, the driver who had to make a call on the tire merchant had one of the lightest machines in the competition, his failure doubtless being due to defective tires rather than to the destructiveness of the machine. The largest car in the competition had a cylinder area of 153 cubic inches. Four machines were entered in the class limited to 67 cubic inches, and of these four one measured but 54 cubic inches. All the machines with the exception of an English Humber in the 122 cubic inch class had two-seater bodies and weight cut down as low as possible, consistent with the rules.

The best performance was put up by a Hurtu four-cylinder, two-seater car which covered the full distance with a fuel consumption equalling 42.4 miles per gallon. This car was entered in the 122 cubic inch class. Following is a list of the cars having completed the tour, together with their gasoline consumption and number of miles per gallon for a distance of 1,952 miles:

Car—Driver	Gallons	M. P. G.
Hurtu, Duval	46.03	42.4
Alva, Rassant	46.22	42.3
Majola, Senart	47.89	40.7
Automobilette, Chabot	51.40	38.1
Autorette, Guerry	53.46	36.5
Phoenix, Seguin	54.36	36.0
Gep, Pons	55.02	35.0
Ponette, Granvaud	57.55	34.0
Sigma, Dutel	59.70	32.8
Automobilette, Coignet	62.30	31.4
Scap, De Fromervault	62.30	31.4
Aquila-Italians, Mathys	63.95	30.6
Diatto, Matthys	64.04	30.5
Arian, Lallier	71.25	27.4
Scap, Genault	75.52	25.9
Fox, Paul	79.23	24.7
Hispano-Suiza, Abit	94.64	20.7
Humber, Mora	96.55	20.3

Interstate Parts Service Completed

MUNCIE, IND., May 12—The Interstate Automobile Co., Muncie, Ind., which was bid in by the firm of Ball Bros., millionaire fruit jar manufacturers in Muncie, last February, has completely reorganized its parts service department and now is prepared to supply parts for any and all Interstate cars regardless of their age.

Army Wants Four 1.5-Ton Trucks May 22

NEW YORK CITY, May 12—The War Department of the U. S. A. is open to bids on four 1.5-ton trucks for use by the first Aero Squadron at Galveston, Tex. The bids close at the office of the Quartermaster's Department in this city on May 22 at 11 a. m.

The specifications call for trucks having an overload capacity of 20 per cent. with either a two- or four-wheel drive through a shaft. The motor must have four cylinders cast en bloc, water-cooled with dual ignition and preferably having three-point suspension. The clutch must be a leather-faced cone, and a four-speed gearset, 120-inch wheelbase, irreversible steering, semi-elliptic springs of chrome silico-manganese steel are specified and the vehicle must not exceed in weight when empty 5,000 pounds.

The body must be 3 feet 4 inches wide, 1 foot 9 inches deep, 9 feet 6 inches long at the bottom and 10 feet at the top; all according to standard army escort wagon specifications, complete with bows and canvas cover. The body must also be detachable back of the driver's seat. The material must consist of white oak, reinforced with angle iron and the floor of the body must be protected by four strips of wearing iron, 1½ by 3/16 inch, running lengthwise full length.

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Receiver for New York Body Concern

NEW YORK CITY, May 14—Judge Hand, in the United States District Court, has appointed H. R. Swartz as receiver for Burr & Co., manufacturer of automobile bodies, at West Seventy-fifth street and Amsterdam avenue. It is stated that the liabilities of the alleged bankrupt amount to $102,000 and the assets about $35,000. The business was started in 1892 by the firm of Burr & Co.

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First Sphinx Car Out on Road

YORK, PA., May 9—The first Sphinx car to be built by the Sphinx Motor Car Co., recently organized at a meeting held in this city, arrived in York this week and made its initial appearance on the streets.

The car was received from Detroit, where it was built by H. R. Averill, formerly sales manager of the Pullman Motor Car Co., now at the head of the Sphinx Motor Car Co. The new product is an attractive five-passenger car, equipped with wire wheels, electric lights, top and windshield. The body is combination metal and wood with stream lines and gasoline tank in cowl. Left hand drive and center control are other features. A large baggage carrying space, with entrance from the rear is a feature. The price of the car is $685, including equipment.

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Garthwaite President of Lee Tire Co.

CONSHOHOCKEN, PA., May 12—A. A. Garthwaite, son-in-law of the late J. Elwood Lee, who was president of the Lee Tire & Rubber Co., Conshohocken, Pa., and who for some time has been vice-president and treasurer of the company, has been made its president. The other officers elected are as follows: John J. Watson, Jr., first vice-president; H. C. Coleman, treasurer. These men together with J. Elwood Lee, Jr., Samuel Wright, M. O'B. Hallowell, Charles Heber Clark, J. Carl De La Cour, H. C. Jones and John M. Dettra form the new board of directors.

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Flood Causes 3-Day Shut-Down of Ford

DETROIT, MICH., May 13—*Special Telegram*—Because of a steady downpour of rain for 36 hours, which is the record rainfall for May for the past 42 years here, the Ford Motor Co. was obliged yesterday afternoon to shut down due to the flooded condition of its power plant. Inadequate sewers connecting with the city mains are said to be the cause of the covering of the powerhouse basement with about 2 feet of muddy water, short-circuiting much of the electrical machinery and damaging the power cables. This made it impossible to work the 50,000 horsepower motor, despite the almost continuous efforts of powerful steam pumps ever since the water threatened to flood.

Accordingly, Secretary James Couzens ordered a shut down of all departments requiring moving machinery, until Friday morning. This means a 3-day lay-off and, figuring on the $5 daily wage, is a loss to the 13,000 idle men of about $165,000. Mr. Couzens stated today that the damage to the plant is very slight, although the interference with the concern's 1,000-car-a-day schedule of production is serious. It is expected that everything will be in working order when the plant is opened up again Friday morning. The office force of about 1,000 is not idle.

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Iowa Little Glidden on July 1

DES MOINES, IA., May 9—The Iowa Little Glidden Tour, under the auspices of the Iowa State Automobile Assn., will be staged this year under the direction of Earl E. Butler of Des Moines, chairman of the contest committee of the Polk County Auto Club. It will be a combination sociability and reliability run which will be timed to reach Sioux City for the races there on July 4. The start will be from Des Moines on July 1, and the first day's run will be to Mason City and Clear Lake. After a night on the shores of the lake the tour will speed westward to Spirit Lake for the second night. Storm Lake will be the noon control for the third day and the tour will reach Sioux City on the evening of July 3. After spending the Fourth in Sioux City the tour will take a short Sunday run to Council Bluffs and Omaha. The last day of the tour will be from Council Bluffs back to Des Moines via the River-to-River road, the Great White Way, and the Panora Speedway.

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A New Flanders Electric Corporation

PONTIAC, MICH., May 11—The Flanders Mfg. Co., Pontiac, Mich., has been succeeded by the Flanders Electric Co., a new corporation with $100,000 capitalization formed to take over the business of the former company. M. Rothschild has been made president, Don C. McCord general manager and B. F. Esgar secretary and treasurer. The principal offices will be located in Detroit. The company proposes to continue the manufacture of the Flanders electric car in its Pontiac plant as heretofore, though a greatly enlarged scale of production shortly will be entered upon.

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Northway Slide Rule for Engineers

DETROIT, MICH., May 14—The Northway Motor Mfg. Co. of Detroit, Mich., is putting out a slide rule which it has distributed to members of the automobile engineering profession throughout the country. This handy little device can be used in making many of the important calculations necessary in automobile engineering, in regard to piston displacement, gear ratio, car speeds, etc.

New Paige-Detroit plant, showing the shipping platform of the new Paige factory. During the month of April, 1914, 1,227 cars left this platform; money value, $1,136,013. This is four times as many cars as were manufactured during the entire season of the company's first year, 3 years ago. In other words, the Paige-Detroit has developed in 3 years from a business of $300,000 to one that will probably reach $12,000,000 before this season is over

Factory Miscellany

TRACTOR CO. Will Build—The Killen-Strait Mfg. Co., Appleton, Wis., gas tractors and other power machinery, which is the reorganization of the Killen-Walsh Mfg. Co., has now been permanently financed and is ready to proceed with its plans for greatly extending the business and production, particularly of Strait tractors. A. W. Priest, an Appleton capitalist, has taken a heavy financial interest and assumed the duties of secretary and treasurer, throwing his large resources to the support of the proposition with an idea of making it one of the largest industries of the kind in America. The concern has declined all offers to remove to other cities and a tempting offer to consolidate with a large Illinois manufacturing concern, and preparations are now being made for the construction and equipment of additional factory buildings.

Brown Co. Equipping Factory—The Brown Mfg. Co., Wilmington, O., is equipping a factory for the manufacture of automobile specialties.

Cowan Wants to Locate—The Cowan Truck Co., Holyoke, Mass., is to secure larger quarters for its factory, either by rental or by the erection of new works.

Ideal Steel Wheel Moves—Arrangements have been completed for removing the plant of the Ideal Steel Wheel Co., of Cincinnati, from that city to Elkhart, Ind. M. E. Crow is general manager.

Branch Factory in Berlin—It is reported that the Royal Automobile Co., Detroit, Mich., contemplates the establishment of a Canadian branch factory at Berlin, Ont.

New Automobile Factory—W. A. Williams, secretary of the Lima Auto Club, Lima, O., has formed a company there for the manufacture of passenger autos, and work on the new plant will start at once. The plant will start with 100 employees.

Will Manufacture Motors—The Marvel Motor Works, Kewaunee, Wis., have been purchased from the Dishmaker interests by John Klemish and son and Adolph Hamacheck, of Kewaunee, who will continue the manufacture of motors and do general motor repairing and reconstruction.

Aetna Co. Manufactures Trucks—The Aetna Motor Truck Co., Detroit, Mich., incorporated with $150,000 capital stock to manufacture automobile trucks, is negotiating for a factory site. The directors of the company are J. G. Wagner, E. E. Kinney, J. J. Wilson and W. A. Eldred.

Beloit Plant Purchased—The works of the defunct John Thompson & Sons Co., at Beloit, Wis., purchased from the trustee by E. M. Kenyon, manager of the Chicago branch of the Dodge Mfg. Co., Mishawaka, Ind., are to be turned into a large gasoline engine industry by Mr. Kenyon. Plans are immature, but it is intimated that part of the production will consist of motors for pleasure and commercial vehicles.

Protects Automobile Plant—As the anniversary of the flood of last spring approaches, Indianapolis has taken extensive precautions to guard against a repetition of similar conditions this year. Chief among the measures to protect West Indianapolis is the construction of a rockbound embankment along White River. The barrier extends well above the high-water mark of last year and gives ample protection to that district.

New Lipman Co. Manufactures Pumps—The Lipman Air Appliance Co., organized last week at Beloit, Wis., with $100,000 capital, is distinct from the Lipman Mfg. Co. of Beloit, although Carl E. L. Lipman is chiefly interested in both concerns. The new company will engage in the manufacture of patented air pumps and appliances designed by Mr. Lipman for motor car use, and will relieve the old company from the production and marketing of this class of goods.

Will Make Automobile Tops—The Armstrong-Johnson Co., Columbus, O., which was incorporated recently with a capital of $10,000, is a partial reorganization of the Barndt-Johnson Co., of South Columbus, which went into the hands of a receiver a year ago. The company will make automobile tops, bodies and other supplies, and will locate a plant in the North Side. W. R. Johnson was elected president; Minter Armstrong, vice-president, and James H. Johnson, secretary.

Bock Bearing Producing—The Bock Bearing Co., a new Toledo, O., concern, has completed its plant on Phillips avenue and the Michigan Central Railroad, and is now ready for business. This plant is one of the most convenient and modern institutions of its size in the city. The factory foundation is 62 by 225 feet. The concern has been carrying on experiments since the first of the year and everything is now satisfactorily adjusted and the company is turning out bearings. H. A. Strong is sales manager.

Hawkins Cyclecar Co. Leases Factory—Arrangements were made at a meeting of the board of directors of the Hawkins Cyclecar Co. to lease the factory and machinery of the Baldner Motor Co., at the corner of East Church and Whiteman streets, Xenia, O., for use in manufacturing cyclecars. The details in connection with the lease of this property will be closed at once. It was arranged to begin the manufacture of the Xenia cyclecar on a large scale on June 1. A large order for motor engines was also authorized at this meeting.

Dunk Buys F. A. L. Auto Co. Assets—A. O. Dunk, president of the Puritan Machine Co., Detroit, Mich., has purchased all the asets of the F. A. L. Auto Co., of Chicago, from S. Winternitz & Co., auctioneers. This purchase includes all the patterns, tools, service parts and other property formerly owned by this concern. This entire stock has been moved from the factory to the Detroit salesrooms and warehouses of the Puritan Machine Co. Mr. Dunk. as president of the Puritan Machine Co.. is one of the largest buyers of defunct automobile and automobile parts concerns in the country and is now supplying repair parts to over 65,000 private owners, whose cars were formerly made by companies now out of business.

The Automobile Calendar

May 14	New York City, S. A. E., Motor Testing Division Meeting.
May 16	Cleveland, O., Cleveland Engineering Society, Special Meeting.
May 16	New York City, Saxon 30-Day Trial.
May 19-20	Boston, Mass., Convention of New England Section of Electric Vehicle Assn. America, Engineers Club.
May 22	New York City, E. V. A. A., New York Section, Consolidated Gas Co. Bldg.
May 23-24	New York City Dealer's Business Demonstration, Motor Dealers Contest Assn.
May 25-26	Palermo, Sicily, Targa Florio, 700-Mile Race.
May 26	Cleveland, O., Semi-Monthly Meeting, Cleveland Engineering Society.
May 27-28	Washington, D. C., National Trade Convention, American Mfgs.' Export Assn.
May 28-30	Chambersburg, Pa., Trys over Lincoln Way from Chambersburg to Pittsburgh, Chambersburg Motor Club.
May 30	Newark, N. J., Cyclecar Run, Newark Cyclecar Club.
May 30	Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
May 30-31	Boston, Mass., N. E. Cyclecar Assn., Run through Mass.
June 1	Palermo, Sicily, Coupe Florio, 279-Mile Race.
June 9	Cleveland, O., Annual Meeting Cleveland Engineering Society.
June 17-18	Fayette Co., Pa., Second Annual Hill Climb, National Pike.
June 18	Uniontown, Pa., Hill Climb, Auto Club of Fayette Co.
June 20	Milwaukee, Wis., Competition Run between Milwaukee Athletic Club and Milwaukee Automobile Club.
June 23-26	S. A. E. Summer Meeting, Cape May, N. J., Cape May Hotel.
June 24-26	Chicago, Ill., Seventh Annual Meeting of Nat. Gas Engine Assn.
June 27-July 4	A. A. A. Touring Week.
June 29-July 2	Chicago to Boston National A. A. A. Reliability Tour.
June 30	London, Eng., Fourth International Rubber and Allied Industries Congress.
July 3-4	Tacoma, Wash., Montamara Festo Races, Tacoma Speedway Assn.
July 4	Sioux City, Iowa, 300-Mile Race, Sioux City Auto Club and Speedway Assn.
July 4	Lyons, France, French Grand Prix.
July 13-14	Seattle, Wash., Track Races, Seattle Speedway Assn.
July 25-26	Belgium Grand Prix Road Races.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupe de l'Auto Race.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 9-Nov. 2	S. A. E. Europe Trip.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.

The Week in the Industry

Motor Men in New Roles

PROF. HATT TESTING WOODS—Prof. W. K. Hatt, head of the mechanical department of Purdue University, Lafayette, Ind., has undertaken an extensive test of woods with a view to finding a substitute for hickory, which is becoming scarce. Wheels also are being tested to determine their strength. A steel ball seven-sixteenths of an inch in diameter is pressed into the wood spoke through a hole in a metal plate, whose thickness is one-half the diameter of the ball. The force required to imbed the ball through the hole in the metal plate into the wood is recorded. The force required varies from 200 to 3,000 pounds, according to the grade of the wood.

Goodhart Sales Manager—The Woods Electric Vehicle Co., of St. Louis, has appointed Louis Goodhart sales manager.

Kendall Firestone's Seattle Manager—F. B. Kendall is the new manager of the Firestone Tire & Rubber Co. in Seattle, Wash.

McCullough Manager—The Grand Central Motor Co., of St. Joseph, Mo., has employed Charles McCullough as manager of its service department. Mr. McCullough has been with the Cole M. C. Co., Indianapolis, Ind.

Evans Commerce Manager—C. C. Evans, for some time associated with the Northwest Buick Co., Seattle, Wash., has left to join the Commerce M. C. Co. at Oakland, Cal., where he will act as manager for that company.

Dunsmoor Oakland Sales Manager—J. C. Dunsmoor, formerly of the Buick Motor Co., of New York City, has been appointed sales manager for the Oakland Motor Co., Philadelphia branch, at 227 and 229 North Broad street.

Dissolve Partnership—Fournier and Rodier have dissolved partnership, the business being continued by J. A. Fournier, who, in addition to handling the MacFarlane Six, will exploit the King car; a new garage has been opened at 395 Bleury street, Montreal.

Mevis Made Manager—George A. Mevis, who got his training with the Knox company, and for the past two years a member of the Packard forces at New York, Hartford and Springfield. Mass., has been appointed manager of the Stevens-Duryea branch in the latter city.

Newmark, of Oakland M. C. Co., Resigns—Following the resignation of George E. Daniels, vice-president and general manager of the Oakland M. C. Co., Pontiac, Mich., comes the announcement that J. H. Newmark, advertising manager of the company, has followed his chief and has also resigned.

Garrison Miller Rubber Manager—The Miller Tire & Rubber Co., Akron, O., has appointed C. L. Garrison, of the Phoenix Auto Supply Co., manager of its newly opened St. Louis branch F. W. Staley, former manager of the local Diamond rubber branch, will be the traveling representative in Illinois and Missouri.

Brouster Rauch-Lang Sales Manager—Harold C. Brouster, formerly connected with the distribution of the Baker electric, and later sales manager of the White company, has taken charge as sales manager of the Rauch-Lang St. Louis company. He succeeds Adolph Zuest, Jr., who resigned to take up a position in another field.

Gruenfeldt Off for Europe—On May 2 Emil Gruenfeldt, chief engineer for The Baker Motor Vehicle Co., Cleveland, O., left for New York, where he will sail immediately for Europe. Mr. Gruenfeldt will be abroad about two months, during which time he expects to take a brief vacation in Germany, and also make an investigation of recent foreign motor car developments.

Promoted and Married—John E. Whitmyer, formerly salesman for the Worcester, Mass., branch of the United States Tire Co., was made manager of the branch last week and a couple of days later he got married and took a five-day honeymoon in the White Mountains. He succeeds William B. Ellenbeck, Jr., who goes to New York to join another tire company.

Baldwin Forms New Company—R. C. Baldwin has resigned his position with the Oxford Motor Cars & Foundries, Ltd., Montreal, Que., and has formed a connection with a newly organized local motor car company. Specifications are now being prepared by an expert engineer well qualified to design a car for Canadian road conditions. As soon as the organization is fully completed he will take entire charge of the designing and construction. It is further announced that the undertaking is financed not only by local capital, but that a large, prosperous American firm is also back of the enterprise, and that business will be pushed along progressive lines.

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Garage and Dealers' Field

St. Louis—The Clyde Adams Gasoline Economizer, a New York manufactured device, has been placed in the local market this week, when the Olive Garage Company signed a contract to distribute the device in the St. Louis territory.

U-S-L Service Station Moved—The New York U-S-L sales office and service station of the U. S. Light & Heating Co., formerly located at 210 West Fiftieth street, has been transferred to the Locomobile building, at 16-24 West Sixty-first street.

Opens New York Starter Branch—The Automatic Appliance Co., Boston, Mass., manufacturer of the Boston starter for Ford cars, has opened a branch at 1876 Broadway, Motor Mart Building, New York City. W. C. Bordeaux has been appointed branch manager.

Moon Co. Make Additions—The Moon M. C. Co., St. Louis, Mo., has installed three large and modern enameling ovens in its plant so that the sheet metal parts of their machines can be made in St. Louis instead of Detroit and other cities, as heretofore has been the case.

National Changes Location—Chester A. Dodge, who has the National agency for Worcester County, with headquarters at Worcester, Mass., has moved into new quarters in the Stafford Square garage building, where he has salesrooms and service station combined.

Velie Salesrooms Opened—F. L. Roberts, who recently took the retail agency for the Velie cars and trucks in Boston and vicinity, opened his new salesrooms and service station last week. It is located at the corner of Newbury and Hereford streets, Boston, in the building where the White company had its home so long.

Jesco Detroit Branch Opened—The Jones Electric Starter Co., of Chicago, manufacturing the Jesco line of electric starting-lighting-ignition apparatus for motor cars, announces the opening of its Detroit office at No. 1211 Woodward avenue. This branch office will be in charge of E. L. Jones, E. E., vice-president and chief engineer of the company.

Rhineland Machine Works Moves—The Rhineland Machine Works, formerly located at 141 West Forty-second street, New York, have removed to 1737 Broadway, Buick building. Their new location gives them 3,000 square feet of floor space, which enables them to carry a complete stock of all sizes of ball bearings and all sizes of A. V. shock absorbers.

Munzer Co.'s $75,000 Building—R. W. Munzer & Sons Co., Minneapolis, Minn., will erect a four-story building at 907 Hennepin avenue for the Hupmobile, with sub-basement. It will cost $75,000 and will be built to add six stories more. The ground lease for the period will be $455,000 and the present building cost $5,000. The offices and showroom will be on the first floor. Cars will be stored in the basement, second and third floors and the shop and parts division will be on the fourth floor.

1914 Marathons To Be Sold—Once again The Times Square Automobile Co., New York and Chicago, comes to the front with an enormous purchase of new automobiles. Word was received at the New York office today, confirming the closing of a deal of about 350 new Marathon cars, 1914 model, equipped with self-starting and lighting systems, which will be placed on sale in both New York and Chicago. As soon as these cars arrive from the factory they will be sold at a price that will startle the automobile world. This transaction is in line with other bargains the firm has been offering the past year, including Abbott Detroit, Regals, Sampson and Hercules trucks, and bargain hunters will now have another chance to obtain another big bargain in an automobile. It will pay our readers to watch their advertisement, which will shortly appear in THE AUTOMOBILE, announcing this sale.

Accessories for the Automobilist

PRICE Automatic Battery Saver—About the only real objection to the adoption of complete electrical equipment is the danger of wasting the battery current either through leaving the powerful headlights lit when the car is put up for the night or the possibility of some urchin switching on the lights when the car is standing unattended at the curb, or playing with the electric horn to the annoyance of the owner as well as all those within hearing.

To obviate these objections John R. Price & Co., Basic City, Va., has brought out a switch, Fig. 1, which is controlled by the suction of the motor through the movement of a leather diaphragm. When the motor is dead the circuit is broken, but as soon as the motor is cranked the switch is automatically thrown into operation.

The switch is simple and has only one moving part. Referring to the section, Fig. 1, it will be seen that the switch terminals T are connected by a brass strip which closes the circuit whenever the suction on the leather diaphragm L is more than 1 ounce. The suction is obtained by connecting the switch with the manifold as illustrated, the suction pipe being connected with the switch at C. Therefore when the motor is cranked, the suction draws the diaphragm to the left enough to close the circuit. A vent is provided at V to allow a free movement of the air caused by the displacement of the diaphragm.

The installation of the switch is simple, consisting merely of bolting the switch to the dash and connecting the suction pipe to the manifold. No soldering is required. After this is done, the switch is put in series with whatever circuits it is desirable to safeguard. Ordinarily these will be only the horn, headlight and ignition circuits.

The switch is strongly made and is guaranteed for 1 year. It retails for $3.

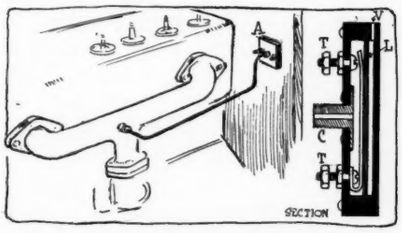

Fig. 1—Automatic battery saver. Method of attachment is shown at the left and a section through the diaphragm switch at the right

Inland Hand Tire Pump—A pump with many interesting features is the Inland, Fig. 2. It is said to be powerful, efficient and rapid. It is designed to be clamped to the running board so that all the operator is required to do is move the handle back and forth in a horizontal direction. This movement is less fatiguing than the vertical movement of the ordinary foot pump. It will inflate a 34 by 3.5-inch tire to 70 pounds pressure in 2 minutes.

When not in use it can be folded up and carried in the tool box as its overall length is only 15.5 inches.

The frame and handle are made from malleable iron and the cylinder and base are constructed of brass. The bore of the pump is 3 inches and the stroke 5 9-16 inches. All bearings are cold rolled steel and the discharge valve is a No-corrode steel check ball affording a quick and free air passage. The handle is 27 inches long with two grips, one for low and the other for high pressures.

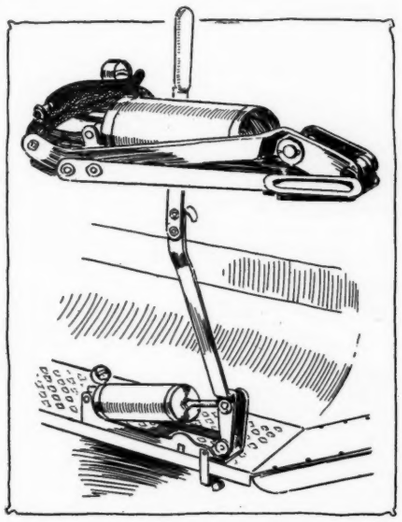

Fig. 2—Inland hand tire pump. Upper view shows pump folded up ready to be placed in the tool box, and the lower method of clamping to the running board

The equipment includes 8 feet of Meruco covered hose and a 200 pound pressure gauge, and the price with gauge is $7.50. It is made by the Inland Mfg. Co., 1948 W. Ohio street, Chicago, Ill.

Bicar Shaft Drive Axle—In line with the present tendency of cyclecar makers to adopt shaft drive in place of belts and chains the Engineering Equipment Co., of Indianapolis, has brought out a light shaft driven axle, Fig. 3.

This axle has a bevel differential and uses Hyatt bearings throughout, the pinion bearing being of the high duty type. A ball thrust bearing is used to support the drive pinion.

High carbon steel is used for the shafts and the differential housing is aluminum. The axle is made in all treads from 36 to 56 inches and can be furnished with wheels if desired. Provision has been made to supply internal brakes alone or both internal and external brakes.

Wiard Automatic Speedler—The Wiard Automatic Speedler is a fuel saver which is operated and controlled by the heat of the motor through the action of a thermostatic blade which is part of the device. The speedler is attached to the intake manifold of the motor so that the air is admitted at right angles to the flow of the mixture. The radiation of heat from the motor, only two degrees variation in temperature being necessary to warp the blade, opens the mushroom valve.

The spray of air which is admitted through the speedler breaks up the large globules of gasoline on their travel from the carburetor to the combustion chamber and the air which is admitted by this process is thus made the mixing agent as well as the active element in the mixture. The speedler is guaranteed to save from 25 per cent. to 40 per cent. on fuel bills and is absolutely automatic and needs no manipulation whatsoever by the driver, it is said.

It is made by the Bresler-Wallace Sales Co., 1031 Dime Bank Building, Detroit, Mich.

Burleigh Watch Carrier—Using one's watch in place of a dash clock is made possible by a wire bracket that clamps to the steering post, allowing the watch to be in full view of the operator. The bracket is flexible so that it is claimed that the watch will suffer less from the road shocks than the ordinary dash clock does. It is adjustable to fit any watch.

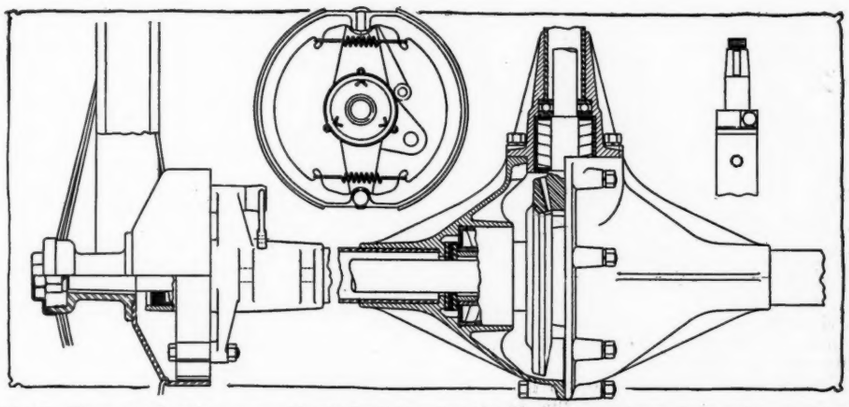

Fig. 3—Bicar shaft drive axle. Hyatt flexible roller bearings are used and internal expanding brakes are fitted

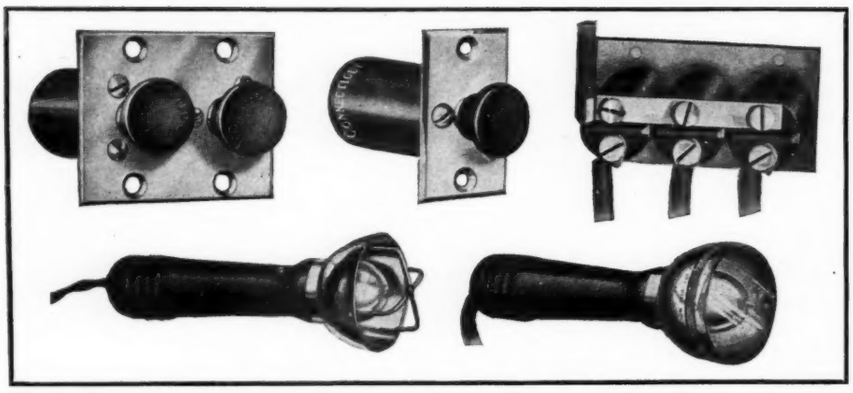

Fig. 4—Upper, center—Connecticut single gang switch. Fig. 5—Upper, right—Three switches connected to the one bus-bar. Fig. 6—Upper, left—Selector switch for dimming headlights. Fig. 7—Lower—Two types of trouble lamps.

It is manufactured by G. K. Burleigh, Penacook, N. H., and sells for $1.

Connecticut Electric Lighting Appliances—A complete line of fittings for use in connection with electric lighting systems is announced by the Connecticut Telephone and Electric Co., Meriden, Conn., well-known manufacturers of magnetos, spark coils, ignitors and other electrical equipment for the automobile. These new appliances are well constructed and finely finished and are in keeping with the other products.

Various types of sockets are made to suit different requirements and several styles of lighting switches are offered. Dash and trouble lamps, and fuse blocks are manufactured.

A single gang switch, known as type N, is shown in Fig. 4. It consists of a cylindrical barrel, 27-32 inches in diameter by 1 1-2 inches long, on the front end of which is mounted a brass plate for attaching it to the dash and on the rear are two binding posts of an approved type.

There are but three parts to the switch, two springs and a plunger, the construction being so simple that it is stated that the switch will last almost indefinitely. The button is made large enough so that it can easily be grasped with gloved hands.

Two, three or four of these units, Fig. 5, can be used in one casing and with one side of the circuit made common by a bus bar, which, however, can be removed without difficulty if not wanted.

In Fig. 6 is shown a selector switch for use either with double filament lamps or with two lamps in the one headlight and arranged to cut in the bright or the dim light at will.

Pulling out the button of the right switch throws on the tail light and bright headlight, while pulling out the left one throws in the dim headlight. Pushing in on this button puts on the bright headlights and disconnects the dim lights, and pushing in on the right button puts on all the lights.

The trouble lamps, Fig. 7, are made in a substantial and neat manner, the upper one having a solid brass reflector heavily nickeled and highly polished with protecting wire guard so arranged that it can be collapsed for the removal or insertion of a lamp. It is fitted with a rubberoid handle, Ediswan attachment plug and 10 feet of cord.

The lower lamp is similar to the other one with the exception that the guard is replaced by a heavy lens which can be removed when the lamp bulb is to be replaced by prying it off of the casing.

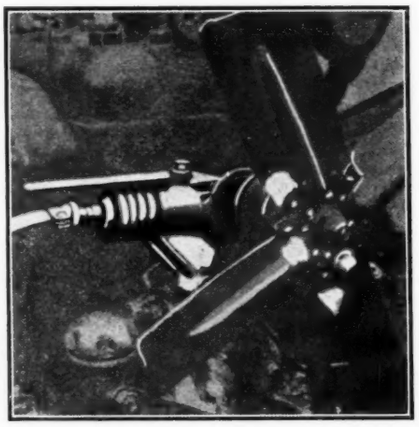

Fig. 8—Colstad engine-driven tire pump for Fords

Fig. 9—Royal Equipment cyclecar brakes

Colstad Engine Driven Tire Pump—Colstad & Co., Boston, Mass., is making a single-cylinder, air-cooled tire pump for use on Fords that is low in price, easily installed, and is capable of inflating a tire in less than 3 minutes.

The pump, Fig. 8, is designed to go on the front of the motor in place of the fan bracket. To install, it is only necessary to take off the present fan shaft and bracket and after boring one hole 5-16-inch in diameter in the inside of the fan pulley in line with the eccentric pin, the fan is mounted in correct position on the pump shaft and the assembly bolted to the motor.

The pump is brought into action by pulling the lever back until the eccentric meshes with the fan pulley, where it will stay locked until released, but before this is done the motor should be slowed down.

It is stated that the best materials are used in the construction of this pump. The cylinder is made from close grained cast iron and ground to size. The bore is 7-8 by 1 1-8 inches. The piston is milled from steel and is lapped to a finish. A ball check valve is used. The equipment includes 11 feet of tubing and Schrader couplings. The price is $7.50, and with gauge $9.

Royal Equipment Cyclecar Brakes—Both internal and external brakes, Fig. 9, for cyclecars are manufactured by the Royal Equipment Co., Bridgeport, Conn.

The external brake is an efficient lever brake made of cold rolled steel lined with Raybestos and can be used either as a service or emergency brake, operating from pedal or hand lever. It is constructed so as to fit any layout of housing. A very slight pressure is required and the action is uniform whether moving forward or backward.

The internal brake is a cam-operated type that has been thoroughly tested out, having been used extensively on Ford cars. The shoes are made in halves and are gray iron castings lined with Raybestos.

B. & W. Rear Housing Puller—Of value to the Ford repairman is the housing puller, Fig. 10, made by the Universal Mfg. Co., Racine, Wis. It consists of two members, one of which is attached to the top of the housing and the other to the bottom, as indicated. Then the housing is forced off by turning up on the screws.

Appleby Ball-Bearing Hinge—A concealed hinge that is simple in construction yet offers many advantages is shown in Fig. 11. It is known as a ball-bearing hinge because the weight of the swinging door is taken by a ball bearing. An interesting feature is that it is detachable without removing any screws or stumps and it is said to be unusually strong and durable.

XL Ford Cutout—The Auto Improvements Co., Bristol, R. I., has recently received a patent on a new muffler cutout, Fig. 12, for Ford cars, which is featured by a special tongue that is said to deflect all the exhaust gases from the muffler to the atmosphere. When in use the tongue drops back into the pipe, forming a tight partition which throws all the gases out into the atmosphere. The cutout is operated by a pedal.

Dihedral Auto Sign—The sign, Fig. 13, consists of two sheets hinged together at one end. The number and inscriptions are cut out in the front sheet, while the back sheet serves as a reflector of the light from the rear lamp.

The sign is secured by means of a

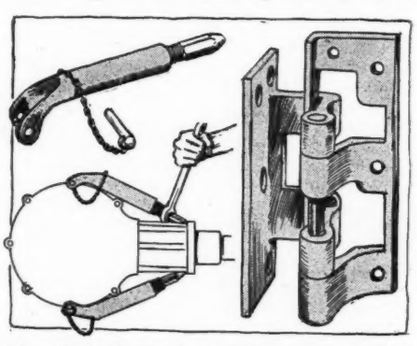

Fig. 10—Left—B & W Ford rear housing puller
Fig. 11—Right—Appleby ball-bearing hinge

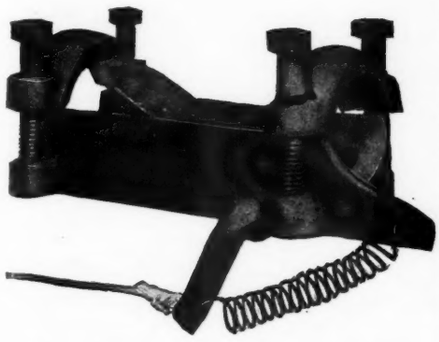

Fig. 12—XL cutout for Ford automobiles

Fig. 13—Dihedral automobile license tag

suitable bracket, or by means of a simple attachment to an existing bracket, so that the front sheet is in a plane with the bull's eye of the rear automobile lamp, which thus makes the front sheet parallel with the back of the automobile. At night the back sheet is swung open to a distance equal to the size of the lamp and held in such a position by the bracket so as to admit the light from the lamp into the open angle, the rays of light falling between the two sheets produce a brilliant and diffused light, causing the figures to stand out clearly and distinctly and making the numbers visible about twice as far away as on the old style signs. The sign has also an additional advantage that the light appears the same from whatever angle the sign is seen, on account of its being diffused after it is reflected. Another advantage is that the number appears in front of the lamp and therefore all the figures are exposed to view, whereas in the old style sign the first and sometimes the second figure also is cut off by the lamp when the observer is on the opposite side of the street.

It is the invention of Louis Gottschall, 462 Broadway, New York City.

Thief-Proof Combination Lock—To insure the car against theft, the Automobile Combination Lock Co., St. Louis, Mo., is placing a combination ignition lock, Fig. 14, that is neat and simple, yet effectively prevents the theft of the car, by breaking the ignition circuits.

The lock, which is situated on the dash, controls the magneto and battery both and therefore not only is it impossible to obtain a spark at the plugs, but the electric starter cannot be operated.

The interior construction consists of a patented combination mechanism comprising a series of perforated disks and a circuit breaker and connector.

To complete the circuit three numbers on the face of the dial are turned a given number of times to the arrow on the top of the case.

To lock the car the dial is given a full turn and the combination circuit connector slides to the breaking or neutral point, thus disconnecting the ignition circuit and locking the car.

The price is $5.

Automobile Dust Covers—Buob & Scheu, Court street and Broadway, Cincinnati, are making waterproof seat and dust covers for all makes of automobiles. These covers are said to be made of the best material, well bound and the arm rests are reinforced with leather. The covers can be simply attached by anyone by means of screw studs and glove fasteners and each set is furnished with all the necessary hardware and instructions for fitting to the car. It is claimed that these covers are easily cleaned and that they protect the leather of the new car and cover up the worn parts of the old machine.

Ferguson Gas Attachment—By means of a special attachment made by the Gibson Distributing Co., New Haven, Conn., it is possible to enable kerosene side and tail lights to burn acetylene. As indicated in Fig. 15, the device consists of a piece of tubing, made of aluminum, to which is attached a burner and a clip by which the tubing is attached to the wick casing of the lamp.

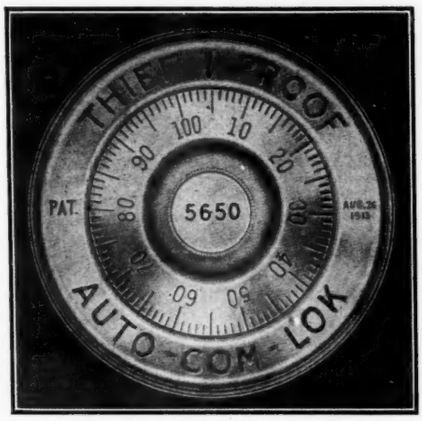

Fig. 14—Thief-proof combination lock

These burners are attached by drilling ¼-inch holes in the sides of the lamps. A set of three costs $2.25.

Breaznell Ignition Clips—Spring clips for wire terminals, Fig. 16, are manufactured by J. H. Breaznell, 26 Court street. Brooklyn, N. Y. These clips consist of three pieces of brass, one being attached to the wire and the other two going around the terminal. They are hooked-shaped and pivoted so that it is unnecessary to remove the terminal nut when attaching the connector and the two halves are sprung apart so that a locking effect on the terminal nut is obtained.

Banker Windshield for Fords—Fig. 17 illustrates a device recently placed on the market by the Banker Windshield Co., Pittsburgh, Pa., for use on shields, such as those used as equipment on Ford automobiles. It can be used on a great many windshields, but the Ford is mentioned inasmuch as it is particularly suitable for a shield of this kind, and there are so many of them on the market.

This attachment is so designed as to provide a means for adjusting the top fold of the shield for rain vision permitting the driver to see under the glass instead of through it, and still protect him from the weather at all times.

It also provides a means of ventilating the front of the car, which experience has taught everyone becomes extremely hot particularly on foredoor types. The price is $5.

Star Pneumatic Self-Starter—A simple self-starter, Fig. 18, that obtains pressure for its operation directly from the working cylinders of the motor is manufactured by the Star Brass Works, Kansas City, Mo. The complete outfit consists of a single-cylinder compressed air motor situated in front that turns the crankshaft through a rack and pinion and ratchet, and a 7 by 40-inch steel storage tank located under the body. The device is operated by depressing a foot-button that opens a valve and allows some of the gas under pressure to flow to the starting motor.

A section of the motor is shown in Fig. 18. It is a single-acting type, the air forcing the piston to the right, so that the rack attached to the piston rotates the pinion that carries the ratchet that in turn operates the ratchet gear on the crankshaft. The piston is returned to its starting position by a spring.

Cuno Extension Night Lamp—To meet the demand for a good lamp at a low price the Cuno Engineering Corp., Meriden, Conn., has brought out the trouble lamp, Fig. 19, which sells for $2.05 with 6 candlepower bulb and 10 feet of cord.

The lamp is long and narrow, the light at one end being well protected by a brass guard. An Ediswan socket of special construction is used. The handle is black enameled and leading from it is an extension cord, the other end of which is attached to a plug connector.

A brass tube fitted over the handle and guard protects the device when in the tool box.

B & S Adjustable Engineers' Wrench—A wrench, Fig. 20, that combines the advantages of a 22.5 degree solid machine wrench with an adjustable feature has just been brought out by the Billings & Spencer Co., Hartford, Conn., large manufacturers of machine tools and drop forgings. It is capable of being used wherever a solid end wrench can be employed. It is compact in design and its thin jaws make it especially available for automobile work.

It is constructed of drop forged steel throughout, specially heat treated, and is finished in black lacquer with a polished head.

There are four sizes, the smallest having a 6 inch handle, a capacity of 5-8 inches and selling for $7.80 per dozen, while the largest is 12 inches long, has a capacity of 1 5-16 inches and sells for $15 per dozen.

Tulite Headlight Bulbs—The problem of reduced illumination to comply with city ordinances and full illumination for

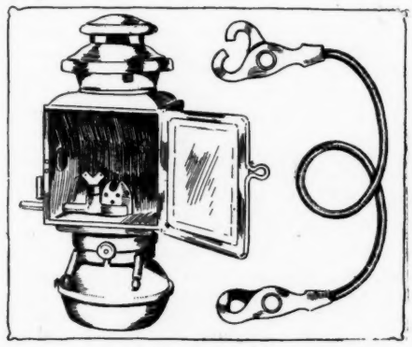

Fig. 15—Left—Ferguson gas attachment
Fig. 16—Right—Breaznell ignition clips

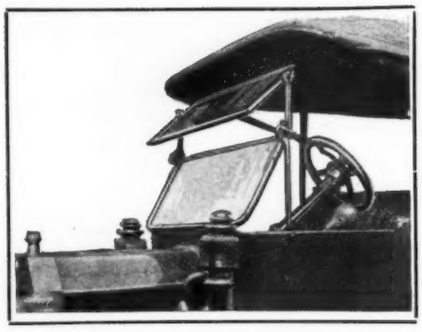

Fig. 17—Banker windshield for Fords

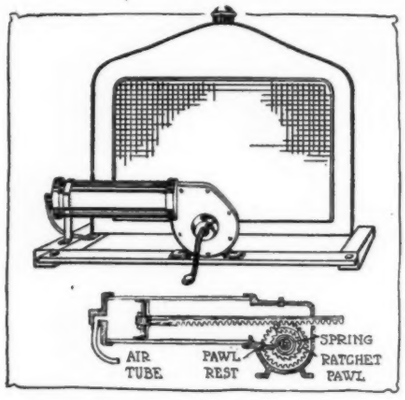

Fig. 18—Star pneumatic self-starter

country driving at night has been attacked in a different way by the Tulite Auto Bulb Co., Detroit, Mich., this concern manufacturing a bulb with two filaments in it, Fig. 21. The larger filament ordinarily supplies 20 candlepower, which is enough for the headlight of ordinary strength, and the smaller, 4 candlepower, for city driving. In this way the function of the side lights is performed by the headlights.

Bulbs of different capacities will be supplied, instead of the standard, varying from 2 and 12 candlepower to 6 and 40, when desired.

The installation is simple. Where a car has side lights the side-light wires are carried forward and attached to the headlight, supplying current to the small filaments, while the regular headlight wires supply current to the larger filaments.

On a new installation only one extra wire is attached to the low candlepower filament.

A special point, worthy of mention, is the placing of the minor filament above the major one, which allows the searchlight to be focused for a long distance, yet when the minor filament is used the light is reflected to the road at a comparatively short distance. This can be arranged to suit the driver without materially interfering with the long range light.

Grus Patent Leaf Spring Oiler—A device that will eliminate the squeaking of the springs, prevent their rusting and will improve the riding qualities of the car, is the Grus spring oiler, Fig. 22.

This device consists of an iron plate with an extension for filling it with oil. It clamps a novel-shaped leather cup or washer tight up against the side of the spring. The oil introduced through the filler opening fills the space in the center of the washer and from thence finds its way between the leaves of the spring. The oiler is clamped over the spring about one-third the distance from the center. The first day the oil cup should be filled with kerosene and after that ordinary cylinder oil should be used. This oiler is made in the following sizes: 1, 1.25, 1.5, 1.75, 2 and 2.25 inches and sell for 75 cents.

Ford Uni-Coil Ignition System—The New York Coil Co., 338 Pearl street, New York, N. Y., manufacturer of master vibrators and other well known Ford accessories, has just placed on the market the Uni-Coil Ignition System, which is especially designed to operate on the Ford flywheel alternating current magneto.

This ignition system consists of an elevating gear bracket attachment, which is clamped on the end plate of the Ford engine after first removing the present timer. Bevel gears transmit motion to a vertical shaft running through the

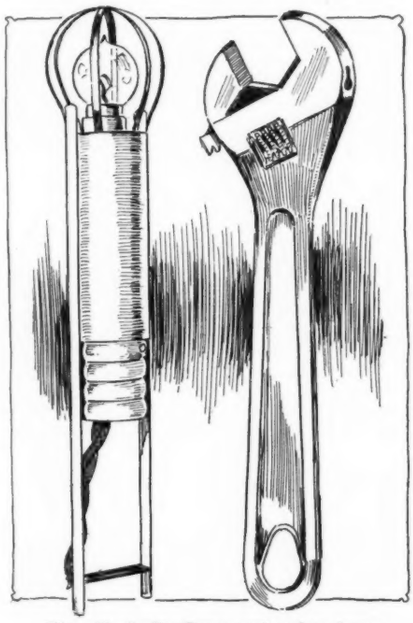

Fig. 19—Left—Cuno extension lamp
Fig. 20—Right—B & S adjustable wrench

bracket upon which is mounted a combined timer and high-tension distributor, or as it is termed synchronizer. All present wiring on the car is removed and by means of a single wire, connection is made to one unit only in the present coil box. A cable runs from the distributing part of the apparatus and is connected to the high-tension terminal of this same unit. The timing or circuit breaking mechanism within the distributor is almost identical with that employed in regular magnetos.

This system, the manufacturers claim, perfectly times the spark and is adapted to operate properly on the Ford flywheel magneto. All troubles of the ordinary timer heretofore experienced are eliminated and as there is but one adjustment the system is extremely easy to understand and take care of.

It is said that the system contains all the features of the high-tension magneto.

The list price of the system complete, including wires, bracket and all necessary attachments to install, is $15. It is sold with a positive guarantee of satisfaction.

Townsan Ford Valve Adjuster—To meet the requirements of Ford motors, the Townsan Auto Specialty Co., Mitchell, S. D., has brought out valve adjusters that are designed to compensate for the extra clearance between valve stems and push rods. They can be applied without any special fitting.

These adjusters consist of oil-tempered spring steel cylinders that are so constructed that they will grip the exposed end of the push rod, thus forming a receptacle for the thin steel disks that are used to reduce the clearance between valve stems and push rods. The price per set is $1.50.

Kepler's Safety Device Patent—H. Kepler, manager of the Western Utilities Co., Devil's Lake, N. D., has applied for a patent on a safety device for automobiles. It is to act if a wheel comes off the car. The device looks like a runner attached to the nose of the front spring, from which point it curves downward under the axle. The inventor says the appliance equalizes the vibration of the front spring.

Chamberlain Plier Wrench—A handy and useful tool that can be used either as an adjustable wrench, wire cutter, pliers, screw driver and die cutter, and which is only slightly heavier and but little more complicated than an ordinary wrench of this type is made by the Chamberlain Wrench Co., Geneva, Ill. The wrench has an adjustable jaw. The pliers is located on the other end of the wrench handle and incorporates the wire cutters at one side. The pliers is so designed that it does not interfere with the use of the tool as a wrench. Standard threads 1-4, 3-8, 5-16 and 1-2 inch in diameter can be cut by means of the button dies which may be inserted in the body of the wrench. The dies are held in place by means of a small screw.

This tool should be of great value to the motorist. It sells for $2.25.

All Purpose Wrench—A handy adjustable wrench, Fig. 23, that will take the place of an S wrench of almost any shape is made by the Universal Wrench and Tool Co., Sterling, Ill. It has a jaw that can be moved through an arc of about 120 degrees, which is sufficient to enable the use of the wrench under almost any conditions.

The jaw is pivoted to the handle and is solidly locked from rotation in either or both directions, as desired, by pressing up on the ratchets A and B.

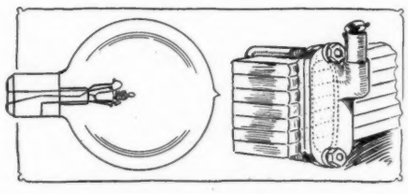

Fig. 21—Left—Tulite headlight bulbs
Fig. 22—Right—Grus patent leaf spring oiler

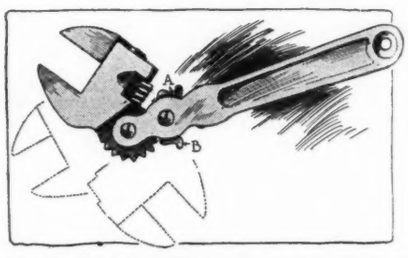

Fig. 23—Universal Wrench Co.'s all-purpose wrench